

EPA Superfund
Record of Decision:

CALIFORNIA GULCH
EPA ID: COD980717938
OU 05
LEADVILLE, CO
10/31/2000

RECORD OF DECISION

OPERABLE UNIT 5

EGWA SITES

CALIFORNIA GULCH SUPERFUND SITE

LEADVILLE, COLORADO

OCTOBER 2000

U. S. Environmental Protection Agency
999 18th Street, Suite 500
Denver, Colorado 80202

RECORD OF DECISION

OPERABLE UNIT 5 EGWA SITES CALIFORNIA GULCH SUPERFUND SITE LEADVILLE, COLORADO

The U. S. Environmental Protection Agency (EPA) presents this Record of Decision (ROD) for Operable Unit 5 (OU5) of the California Gulch Superfund Site in Leadville, Colorado. This includes slag and non-residential and residential area soils for Elgin Smelter, Grant/Union Smelter, Western Zinc Smelter and Arkansas Valley South Hillside Slag Pile sites (collectively known as the "EGWA" sites). The ROD is based on the Administrative Record for OU5 EGWA sites, including the Remedial Investigation/Feasibility Study (RI/FS), the Proposed Plan, the public comments received, and EPA responses. The ROD presents a brief summary of the RI/FS, actual and potential risks to human health and the environment, and the selected remedy. EPA followed the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, the National Contingency Plan (NCP), and EPA guidance (EPA, 1999) in preparation of the ROD. The three purposes of the ROD are to:

1. Certify that the remedy selection process was carried out in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (collectively, CERCLA), and, to the extent practicable, the NCP;
2. Outline the engineering components and remediation requirements of the Selected Remedy; and
3. Provide the public with a consolidated source of information about the history, characteristics, and risk posed by the conditions of OU5 EGWA sites, as well as a summary of the cleanup alternatives considered, their evaluation, the rationale behind the Selected Remedy, and the agencies' consideration of, and responses to the comments received.

The ROD is organized into three distinct sections:

1. The **Declaration** section functions as an abstract for the key information contained in the ROD and is the section of the ROD signed by the EPA Regional Administrator.
2. The **Decision Summary** section provides an overview of the OU5 EGWA characteristics, the alternatives evaluated, and the analysis of those options. The Decision Summary also identifies the Selected Remedy and explains how the remedy fulfills statutory requirements; and
3. The **Responsiveness Summary** section addresses public comments received on the Proposed Plan, the RI/FS, and other information in the Administrative Record.

DECLARATION

DECLARATION

SITE NAME AND LOCATION

Operable Unit 5 EGWA Sites
California Gulch Superfund Site
Leadville, Colorado
CERCLIS # COD980717938

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Selected Remedy for Operable Unit (OU) 5 Elgin Smelter, Grant/Union Smelter, Western Zinc Smelter and Arkansas Valley South Hillside Slag Pile sites (collectively known as the "EGWA" sites) within the California Gulch Superfund Site ("the Site") in Leadville, Colorado. The Environmental Protection Agency (EPA) selected the remedy in accordance with Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (collectively, CERCLA), and to the extent practicable, the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, the National Contingency Plan (NCP).

This decision is based on the Administrative Record for OU5 EGWA sites within the California Gulch Superfund Site. The Administrative Record (on microfilm) and copies of key documents are available for review at the Lake County Public Library, located at 1115 Harrison Avenue in Leadville, Colorado, and at the Colorado Mountain College Library, in Leadville, Colorado. The complete Administrative Record may also be reviewed at the EPA Superfund Record Center, located at 999 18th Street, 5th Floor, North Terrace in Denver, Colorado.

The State of Colorado has been consulted throughout the preparation of this Record of Decision (ROD). The State is aware of EPA's selected remedy and has chosen to make no further comment.

ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect public health or welfare or the environment from actual or threatened releases of contaminants from the OU5 EGWA sites, which may present an imminent and substantial endangerment to public health or welfare.

DESCRIPTION OF THE SELECTED REMEDY

This ROD specifically addresses the portion of OU5 that includes slag, non-residential and residential area soils at the EGWA sites. The OU5 EGWA sites are one of 11 OUs within the Site identified as source areas. The remaining portions of OU5 (the "AV/CZL" sites) will be addressed separately. The OU5 EGWA sites include slag, non-residential and residential area soils from former smelter sites. Pursuant to the August 26, 1994 Consent Decree at the California Gulch Superfund Site, it was agreed that the decision on remediation of Site-wide Surface Water and Groundwater (i.e., OU12) would be made only after records of decision for source remediation were selected and implemented at each OU. Remedial actions selected for the OU5 EGWA sites are consistent with the ASARCO, Inc. work area management plan (WAMP).

The Selected Remedy is the Institutional Controls Alternative, which was presented in the Final Focused Feasibility Study Report (FFS) (McCulley, Frick & Gilman, Inc.[MFG], 1999). The FFS evaluated and screened remedial alternatives retained in the site-wide Screening Feasibility Study (EPA, 1993) for slag and non-residential area soils. Non-residential area soils are defined as soil in areas currently zoned agricultural/forest, recreational, highway/business, retail core, commercial, and industrial mining. For the purpose of the

FFS and ROD, non-residential area soils were evaluated instead of both non-residential and residential area soils because no residences are located within the OU5 EGWA sites. However, it is reasonably anticipated that some of the sites may be occupied as residential land use in the future based on the current residential zoning.

The FFS used a comparative analysis to evaluate four alternatives and identify the advantages and disadvantages of each. Selection of the Institutional Controls Alternative was based on this analysis. The Selected Remedy consists of measures to provide information to current and/or future land owners regarding the environmental conditions at the site through a zoning "overlay district," and to ensure that if the site is developed any necessary special precautions or requirements are followed. Any sampling or response actions will be conducted or funded by ASARCO Inc., consistent with the development plans. The Selected Remedy is protective of human health and the environment, and is considered effective because (1) slag in its existing condition does not present a significant risk to human health or the environment, (2) no significant pathways for transport of contaminants of concern (COC) from soil or other environmental media have been identified, (3) the EGWA sites are currently vacant; however, the sites may intermittently be used for recreation. One sample location at the Elgin Smelter site has been identified as having lead and arsenic concentrations in soil that exceed the action level for recreational use. The Elgin Smelter site is private property and will be evaluated in 2001 as part of the five- year site review, and (4) as the land use changes, the institutional controls will ensure that waste left in place will be addressed to prevent exposure to human health.

STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions to the maximum extent practicable. The remedy for the OU5 EGWA sites does not satisfy the statutory preference for treatment as a principal element of the remedy because various treatment options considered early in the feasibility study process for slag, non-residential area soils, and residential area soils were determined to be either technically impracticable and/ or not cost effective. Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site above health-based levels that will allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. This remedy is acceptable to the community of Leadville.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD.
Additional information can be found in the Administrative Record for this site.

- COCs and their respective concentrations.
- Baseline risk represented by the COCs.
- Cleanup levels established for COCs and the basis for these levels.
- How source materials constituting principal threats are addressed.
- Current and reasonably anticipated future land use assumptions used in the baseline risk assessments and ROD.
- Potential land use that will be available at the site as a result of the Selected Remedy.
- Estimated capital costs, annual operation and maintenance costs, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.
- Key factors that led to selecting the remedy.

Max H. Dodson
Assistant Regional Administrator
Ecosystems Protection and Remediation
U. S. Environmental Protection Agency, Region VIII

Date

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LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirements
Asarco	ASARCO Incorporated
AWQC	Ambient Water Quality Criteria
BARA	Baseline Aquatic Ecological Risk Assessment
CD	Consent Decree
CDM	Camp Dresser & McKee Inc.
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	Contaminants of Concern
CZL	Colorado Zinc- Lead
EGWA	Elgin Smelter, Grant/ Union Smelter, Western Zinc Smelter, and Arkansas Valley South Hillside Slag Pile
EPA	U. S. Environmental Protection Agency
ERA	Ecological Risk Assessment
FEC	Foothill Engineering Group
FS	Feasibility Study
FFS	Focused Feasibility Study
Golder	Golder and Associates
HI	Hazard Index
HQ	Hazard Quotient
LCCHP	Lake County Community Health Program
MFG	McCulley, Frick & Gilman, Inc.
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MK	Morrison Knudsen Corporation
mm	Millimeter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NRHP	National Register of Historic Places
O&M	Operation and Maintenance
OU	Operable Unit
PG	Primary grid
PRP	Potentially Responsible Party
RA	Risk Assessment
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SFS	Screening Feasibility Study
SPLP	Synthetic Precipitation Leaching Procedure
TBV	Toxicity Benchmark Values
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UAO	Unilateral Administrative Order
UCL	Upper confidence limit of the arithmetic mean
USDC	U. S. District Court
WCC	Woodward-Clyde Consultants
ug/L	Micrograms per liter
um	Micron
umhos/cm	Micromhos per centimeter

1.0 SITE NAME, LOCATION, AND DESCRIPTION

Operable Unit 5 EGWA Sites
California Gulch Superfund Site
Leadville, Colorado
CERCLIS # COD980717938

The California Gulch Superfund Site ("the Site") is located in Lake County, Colorado, in the upper Arkansas River basin, approximately 100 miles southwest of Denver (see Figure 1). The study area at the Site encompasses approximately 16.5 square miles and includes the towns of Leadville and Stringtown, a portion of the Leadville Historic Mining District, and the portion of the Arkansas River from its confluence with California Gulch downstream to the Lake Fork Creek confluence.

The California Gulch Superfund Site has been organized into 12 operable units (OU). Figure 2 shows the Site study area boundaries and the location of the 12 OUs within the California Gulch Superfund Site. The U. S. Environmental Protection Agency (EPA) is the lead agency for activities at the California Gulch Superfund Site and is supported by the State of Colorado through the Colorado Department of Public Health and Environment (CDPHE). ASARCO Incorporated (ASARCO), a potentially responsible party (PRP), is financing the remedial actions at OU5.

OU5 includes four smelter sites (Elgin Smelter, Grant/Union Smelter, Western Zinc Smelter and Arkansas Valley South Hillside Slag Pile) as shown in Figure 3. This Record of Decision (ROD) specifically addresses the stag, non-residential and residential area soils for Elgin Smelter, Grant/Union Smelter, Western Zinc Smelter and Arkansas Valley South Hillside Slag Pile sites, collectively known as the "EGWA" sites. The remaining portion of OU5, which includes the Arkansas Valley Smelter and Colorado Zinc-Lead Mill sites, will be addressed separately.

The Elgin Smelter site is located in north-central Leadville on the south bank of Big Evans Gulch near the intersection of U. S. Highway 24 and State Highway 91. The Elgin Smelter site operated intermittently from 1879 until 1903. Materials at this site consist primarily of slag piles and slag veneer, and minor amounts of smelter debris and coke/coal. The Elgin Smelter features are shown in Figure 4. The estimated total volume of slag and slag veneer is approximately 1,000 cubic yards. The volume of smelter debris has not been estimated. Currently the Elgin Smelter site is vacant. The site is located within the Business zoning district (i.e., commercial/industrial) established by the Lake County Board of County Commissioners (Lake County, 1997).

The Grant/Union Smelter site, which was actually two separate smelters, is located near the confluence of Georgia Gulch and California Gulch and northeast of the Colorado Mountain College campus. The Grant Smelter operated from 1878 to 1882 and the Union Smelter operated intermittently from 1892 to 1900. Currently, smelter waste material identified at the site consists of a small slag pile located to the northwest of the former smelter, a relatively larger slag pile apparently placed to construct a railroad grade that crosses the site, scattered areas of slag veneer, and coke and/or coal located to the northeast of the former smelter. The Grant/Union Smelter features are shown in Figure 5. The volume of the slag pile located to the northwest of the former smelter is estimated at 5,200 cubic yards. Based on aerial photography, the volume of the slag at the abandoned railroad grade is estimated to be 63,500 cubic yards, and the volume of the veneer slag layer is 1,500 cubic yards. The land is vacant at this time. Part of this site is located within Urban Residential zoning district established by the Lake County Board of County Commissioners (Lake County, 1997) and the remaining portion is located within the Traditional Residential/Commercial zoning district established by the City of Leadville. Current land use surrounding the site consists of both residential and recreational use.

The Western Zinc Smelter site is located in the western part of Leadville, approximately 75 feet west of McWethy Drive and approximately 100 feet south of the Lake County Fairgrounds. The Western Zinc Smelter began operations in 1914 and continued operating until 1926. The smelter processed zinc ore to a zinc oxide product for use as pigment. Materials identified in 1992 (WCC, 1992a) include slag piles, slag veneer, smelter debris (including old foundation footprints and bricks possibly used in the furnaces), and solidified bag-house/flue dust. The Western Zinc Smelter features are shown in Figure 6. The volume of the slag piles is estimated to be approximately 23,000 cubic yards. The volume of bag-house/flue dust and smelter debris are estimated at less than 5 and 600 cubic yards, respectively. The land is vacant at this time. The site is located within an Urban Residential zoning district established by the Lake County Board of County Commissioners (Lake County, 1997).

The Arkansas Valley South Hillside Slag Pile is located south of U. S. Highway 24 on the hillside across from the Arkansas Valley Smelter site and extends approximately 2,000 feet, roughly paralleling California Gulch and U. S. Highway 24. This slag pile is also referred to in the Lead Slag Remedial Investigation (RI) report as the "Tramway" Slag Pile (MK, 1992a). The history of this slag pile is unknown; it is possible that either the Arkansas Valley or Grant/Union Smelters supplied the slag at this site. Using current aerial photographs the volume is estimated to be approximately 16,000 cubic yards from the two elongated piles of slag. The larger slag pile exists as a wedge-shaped mound, forming what appears to have been a roadbed up to 50 feet wide at the base. The smaller slag pile extends southeast about 400 feet. The site features of the Arkansas Valley South Hillside Slag Pile are shown in Figure 7. Much of the slag consists of air-cooled, whole "slag buttons" measuring up to three feet across. There are no smelter remains, building debris, or other waste materials except slag. The land at this site is vacant at this time. The site is located within the Industrial and Mining zoning district established by the Lake County Board of County Commissioners (Lake County, 1997).

Lake County is relatively small (380 square miles) and is predominately rural, with a 1990 population of 6,007 (U. S. Department of Commerce, 1990). About half of this population resides within the City of Leadville. The population of Lake County has fluctuated with the mining industry. The population increased to about 9,000 between 1960 and 1981 and then declined throughout the 1980s. About two-thirds of the land in Lake County is federally owned and is either part of San Isabel National Forest or managed by the Bureau of Land Management.

The climate of Lake County is semi- arid continental, characterized by long, cold winters and short, cool summers. The City of Leadville is at an elevation near 10,000 feet above mean sea level. The average annual maximum temperature in the Leadville area is 50.5 degrees Fahrenheit, and the average annual minimum temperature is 21.9 degrees Fahrenheit, with an annual mean temperature of 37.3 degrees Fahrenheit. Average annual precipitation is approximately 16 inches, which represents 59 years of record from the Colorado Climate Center (1997). Prevailing winds in the Leadville area are largely from the west-northwest and to a lesser extent from the northeast (ESI, 1986), with winds typically ranging from 0 to 20 miles per hour (WCC, 1992b).

2.0 OPERABLE UNIT HISTORY AND ENFORCEMENT ACTIVITIES

The California Gulch Superfund Site is located in the highly mineralized Colorado Mineral Belt of the Rocky Mountains. Mining, mineral processing, and smelting activities have produced gold, silver, lead, and zinc for more than 130 years in the Leadville area. The Leadville Historic Mining District includes an extensive network of underground mine workings in a mineralized area of approximately eight square miles located around Breece Hill. Mining in the District began in 1860, when placer gold was discovered in California Gulch. As the placer deposits were exhausted, underground workings became the principal method for removing gold, silver, lead, and zinc ore. As these mines were developed, waste rock was excavated along with the ore and placed near the mine entrances. Many mines were operated in the area as evidenced by more than 2,000 mine waste rock piles identified at the California Gulch Superfund Site. Mined ore was transported to nearby mills where it was crushed and separated into metallic concentrates and waste (mill tailing). The high grade ores and mill concentrates were refined and processed at smelters. Slag and other waste products were produced from the smelters.

Approximately 17 smelter facilities are reported to have once operated within the Site. Most operations ceased by about 1900, although some facilities once continued to operate into the 1960s. At present, nearly all the mines within the site boundaries are inactive. All of the mills and smelters that operated on the Site are inactive and/or demolished.

Due to historic mining, milling, and smelting operations, the Site contains many tailing, impoundments, fluvial deposits, slag piles, waste rock piles, and mine water drainage tunnels. Slag on the Site is the waste byproduct of smelting and results from the processing of ore in high temperature furnaces.

The California Gulch Site was placed on the National Priorities List (NPL) in 1983 under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. The Site was placed on the NPL because of concerns about the impact of mine drainage on surface waters in the California Gulch and the impact of heavy metals loading in the Arkansas River.

In September 1990, EPA and the PRPs entered into an Administrative Order on Consent (AOC) for the performance of soils sampling and air monitoring. EPA issued a Unilateral Administrative Order (UAO) in 1991 that required ASARCO to conduct studies and complete RIs.

Several subsequent investigations have been conducted within the California Gulch Superfund Site that have addressed the smelter/slag/mill sites (i.e., OU5). A Smelter Site Reconnaissance (WCC, 1992a) was conducted in 1991 as part of the Smelter RI and a Slag Pile Reconnaissance as part of the Slag Pile RIs.

In 1991 through 1992, a Smelter RI was conducted and primarily focused on smelter impacted soils but also included sampling of discrete locations where smelter bag houses, dust chambers, or roasting furnaces may have been located (Walsh, 1993). This study was initiated by ASARCO and included the Elgin Smelter, Grant/Union Smelter, Western Zinc Smelter, and Arkansas Valley Smelter sites.

A surface water RI (Surface Water RI) of the California Gulch Site was conducted in 1991 and 1992. The final Surface Water RI report was issued in 1996 describing the results of the surface water investigation (Golder, 1996a). The study included surface water and sediment sampling in the Arkansas River and its tributaries, including California Gulch.

A groundwater RI (Hydrogeologic RI) at the California Gulch Site was conducted in 1991 through 1992. The study included installation of monitoring wells and piezometers, water level measurements, and groundwater sampling and analysis. The final Hydrogeologic RI Report describing the results of the investigation was issued in 1996 (Golder, 1996b). Objectives of the study were to investigate groundwater quality and flow directions,

evaluate potential impacts to surface water receptors, and characterize background groundwater quality.

Denver and Rio Grande Western Railroad, another PRP at the Site, undertook RIs of seven major lead slag piles (MK, 1992a) including the Elgin Smelter and Grant/Union Smelter sites and one zinc slag pile (MK, 1992b), Western Zinc slag pile, within the California Gulch Site. The Zinc Slag RI was performed concurrent with the Lead Slag Pile RI. Investigation activities during these two RIs focused mainly on the slag material that may have the potential to leach metals to the environment.

In 1993, the EPA conducted a Screening Feasibility Study (SFS) (EPA, 1993) to initiate the overall CERCLA feasibility study (FS) process at the California Gulch Site. The purpose of the SFS was to develop general response actions and identify an appropriate range of alternatives applicable to the various contaminant sources to be considered during feasibility studies for the California Gulch Site. Remedial alternatives retained in the SFS for slag and non-residential area soils in OU5 for the EGWA sites were further evaluated and screened during the focused feasibility study (FFS) (MFG, 1999).

ASARCO entered into a Consent Decree (CD) (USDC, 1994) with the United States, the State of Colorado (State), and other PRPs at the California Gulch Site on May 4, 1994. In the CD, ASARCO agreed to perform certain remediation work in three operable units (OU5, OU7, and OU9). The Work Area Management Plan, included as Appendix B to the CD (USDC, 1994), defines the scope of work to be performed by ASARCO.

In February of 1999, ASARCO submitted the Focused Feasibility Study for Operable Unit 5 EGWA Sites (MFG, 1999), according to the terms of the CD. The FFS provided a detailed analysis of the two retained alternatives from the SFS as applied to slag and four alternatives from the SFS for non-residential area soils. Non-residential area soils are defined as soil in areas currently zoned agricultural/forest, recreational, highway/business, retail core, commercial, and industrial mining. For the purpose of the FFS and ROD, non-residential area soils were evaluated instead of both non-residential and residential area soils because no residences are located within the OU5 EGWA sites. However, it is reasonably anticipated that some of the sites may be occupied as residential land use based on the current residential zoning. Institutional controls will ensure future protectiveness.

A Proposed Plan describing the EPA's preferred alternative was issued on July 27, 2000. The preferred alternative was Alternative 2, Institutional Controls.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Public participation is required by CERCLA Sections 113 and 117. These sections require that before adoption of any plan for remedial action to be undertaken by EPA, the State, or an individual (e.g., PRP), the lead agency shall:

1. Publish a notice and make the Proposed Plan available to the public, and
2. Provide a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the site regarding the Proposed Plan and any proposed findings relating to cleanup standards. The lead agency shall keep a transcript of the meeting and make such transcript available to the public. The notice and analysis published under item #1 above shall include sufficient information to provide a reasonable explanation of the Proposed Plan and alternative proposals considered.

Additionally, notice of the final remedial action plan set forth in the ROD must be published, and the plan must be made available to the public before commencing any remedial action. Such a final plan must be accompanied by a discussion of any significant changes to the preferred remedy presented in the Proposed Plan along with the reasons for the changes. A response (Responsiveness Summary), to each of the significant comments, criticisms, and new data submitted in written or oral presentations during the public comment period must be included with the ROD.

EPA has conducted the required community participation activities through the presentation of the RI/FS and the Proposed Plan, a 30-day public comment period, a formal public hearing, and the presentation of the Selected Remedy in this ROD. Written comments were received from CDPHE. EPA's response to written comments received during the public comment period is included in the Responsiveness Summary, which is Appendix A.

The Proposed Plan for OU5 EGWA sites was released for public comment on July 27, 2000. The RI/FS and the Proposed Plan were made available to the public in the Administrative Record located at the EPA Superfund Records Center in Denver and the Lake County Public Library in Leadville. A formal public comment period was designated from July 27 through August 28, 2000.

On August 1, 2000, the EPA hosted a public meeting to present the Proposed Plan for EGWA Sites OU5 of the California Gulch Superfund Site. The meeting was held at 7:00 p.m. in the Mining Hall of Fame and Museum in Leadville, Colorado. Representatives from ASARCO presented the Proposed Plan, which discussed the following four alternatives:

- Alternative 1: No Action
- Alternative 2: Institutional Controls
- Alternative 3: No Action for Slag, Containment for Non-Residential Area Soils and Residential Area Soils, and Institutional Controls
- Alternative 4: No Action for Slag, Removal/Transport/Disposal of Non-Residential Area Soils and Residential Area Soils to an On-Site Repository, and Institutional Controls

Institutional Controls, Alternative 2, was presented as EPA's preferred alternative. A portion of the public meeting was dedicated to answering questions and accepting formal oral comments from the public. Community acceptance of the Selected Remedy is discussed in Section 10.0, Summary of Comparative Analysis of Alternatives, of this Decision Summary.

4.0 SCOPE AND ROLE OF OPERABLE UNIT

The California Gulch Superfund Site covers a wide area (Figure 2). As with many Superfund sites, the problems at the California Gulch Superfund Site are complex. As a result, EPA established the following OUs for the division of liability in geographically-or media-based areas within the Site. The OUs are designated as:

OU1	Yak Tunnel/Water Treatment Plant
OU2	Malta Gulch Fluvial Tailing/Leadville Corporation Mill/Malta Gulch Tailing Impoundment
OU3	D&RGW Slag Piles/Railroad Easement/Railroad Yard and Stockpiled Fine Slag
OU4	Upper California Gulch
OU5	ASARCO Smelter/Slag/Mill Sites
OU6	Starr Ditch/ Penrose Dump/Stray Horse Gulch/Evans Gulch
OU7	Apache Tailing Impoundments
OU8	Lower California Gulch
OU9	Residential Populated Areas
OU10	Oregon Gulch
OU11	Arkansas River Valley Floodplain
OU12	Site-Wide Water Quality

Remedial actions undertaken within OU5 EGWA sites are intended to be consistent with the remedial action objectives and goals identified for the entire California Gulch Superfund Site and other OU investigations.

This decision document makes no determination on whether surface water or groundwater within OU5 EGWA sites requires remediation. Pursuant to the August 26, 1994, CD at this Site, (USDC, 1994) it was agreed that the decision on remediation of Site-wide Surface Water and Groundwater (OU12) would be made only after remedies for source remediation were selected and implemented at each OU. As a result, specific water quality goals for Surface Water and Groundwater have not been established at this time.

5.0 SUMMARY OF SITE CHARACTERISTICS

Numerous investigations have been conducted at the California Gulch Superfund Site for the purpose of: (1) characterizing site-wide environmental conditions; (2) identifying and characterizing historic smelter activities and associated waste materials; and (3) characterizing lead and zinc slag. Site characterization to assess the general conditions of the OU5 EGWA sites and to evaluate the nature and extent of contamination within these sites is based on information presented in the FFS (MFG, 1999), Lead Slag RI (MK, 1992a), Zinc Slag RI (MK, 1992b), Soils Investigation (CDM, 1994), Smelter RI (Walsh, 1993) and Smelter Supplemental RI (WESTEC, 1997a).

5.1 PHYSICAL CHARACTERISTICS

The physical characteristics of each of the four sites are discussed below.

5.1.1 Summary of Soil and Smelter Waste Material Sampling - Elgin Smelter

Soil and smelter waste material samples were obtained at the Elgin Smelter site. Sample LES101, a composite slag sample, was obtained during the Lead Slag RI (MK, 1992a). Samples collected during the Smelter RI included one discrete sample, S09-003, and three primary grid (PG) samples, PG-620, PG-621, and PG-643 (Walsh, 1993). Three samples, SEL01, SEL02, SEL03, were collected during the Smelter Supplemental RI (WESTEC, 1997a). Analytical results and the locations for these samples are shown on Figure 8.

The average concentrations of lead and arsenic in soil from the 0 to 6 inch depth interval at the Elgin Smelter site are 2,790 and 113 mg/kg, respectively.

5.1.2 Summary of Soil and Smelter Waste Material Sampling - Grant/Union Smelter

Soil and smelter waste material samples were obtained at the Grant/Union Smelter site. One sample, GGS101, was obtained during the Lead Slag RI (MK, 1992a). Five samples obtained during the Smelter RI include PG-215, PG-216, PG-232, PG-252, and PG-275 (Walsh, 1993). Sample SGU01 was collected during the Smelter Supplemental RI (WESTEC, 1997a). Analytical results and the locations for these samples are shown on Figure 9.

The average concentrations of lead and arsenic in soil from the 0 to 6 inch depth interval at the Grant/Union Smelter site are 2,286 and 50 mg/kg, respectively.

5.1.3 Summary of Soil and Smelter Waste Material Sampling - Western Zinc

Soil and smelter waste material samples were obtained at the Western Zinc Smelter site. Four samples, HSS101, HSS102, HSS103, and HSS104, were obtained during the Zinc Slag RI (MF, 1992b). As reported in the Smelter RI, four primary grid samples (PG-208, PG-222, PG-223, and PG-238) and two discrete samples (S22-001 and S22-002) were obtained (Walsh, 1993).

One sample, SWZ01, was obtained for suspected bag-house/flue dust during the Supplemental Smelter RI (WESTEC, 1997a).

Analytical results and the locations for all the samples are shown on Figure 10. In addition, Toxicity Characteristic Leaching Procedure (TCLP) analysis of sample SWZ01 (suspected baghouse/flue dust material) shows that the metals in this material are not readily leachable and the material is relatively inert chemically. Concentrations of arsenic, cadmium and lead in the TCLP effluent were all below the respective limits of detection for these metals. Zinc was detected in the TCLP effluent at a concentration of 0.01 milligrams per liter (mg/L).

The average concentrations of arsenic and lead in soil from the 0 to 6 inch depth interval at the Western Zinc Smelter site are 100 and 803 mg/kg, respectively.

5.1.4 Summary of Sampling - Arkansas Valley South Hillside Slag Pile

There has been no sampling or analysis of slag material at the Arkansas Valley South Hillside Slag Pile site. As part of the site- wide Soils Investigation (CDM, 1994) and Smelter RI (Walsh, 1993), soil surrounding the site was sampled and analyzed. Analytical results and the locations for these sampling efforts are shown on Figure 11.

Samples obtained as part of the site- wide Soils Investigation included PG-046, PG-065, and PG-076. Samples obtained as part of the Smelter RI included SME-147 and SME-152. The results indicated that soils at the site may have been impacted by emissions from the Arkansas Valley Smelter, rather than by metals released from the Arkansas Valley South Hillside Slag Pile (CDM, 1994).

The average arsenic and lead concentrations in soil for the Arkansas Valley South Hillside Slag Pile site are 140 and 1,161 mg/kg, respectively.

5.2 GROUNDWATER AND SURFACE WATER QUALITY

Synthetic Precipitation Leaching Procedure (SPLP, EPA Method 1312) and column leaching tests conducted on samples of lead and zinc slag indicate that metal concentrations in slag leachate is not a significant contaminant migration pathway (MK, 1992a and 1992b).

5.2.1 Elgin Smelter

Results of the Surface Water RI (Golder, 1996b) indicate that surface water quality in Big Evans Gulch is not being adversely affected by waste materials at the Elgin Smelter site. Surface water sampling station EG-1 is located on Big Evans Gulch upstream of the confluence with Little Evans Gulch and approximately 2,500 feet upstream from the former Elgin Smelter site. Surface water sampling station EG-2 is located approximately 1,000 feet downstream of the Elgin Smelter site. Results of the Surface Water RI for the four EGWA sampling stations are presented in Table 1. Water chemistry data for upgradient (EG-1) and downgradient (EG-2) stations are virtually identical indicating that the smelter materials were not a significant source of metals to Evans Gulch during this sampling period. Any impact to Surface Water and Groundwater will be addressed in OU12.

5.2.2 Grant/Union Smelter

There are no surface water features at the site and no obvious runoff channels or erosion features that would indicate a potential migration pathway to Georgia Gulch or California Gulch. Sampling conducted at Georgia Gulch (surface water monitoring station GG-1) indicates that water quality in this drainage does not appear to be adversely affected by slag or other materials at the Grant/ Union Smelter site (Golder, 1996b). Surface water monitoring station GG-1 is located immediately west of the former Grant/Union Smelter site, just upstream from the confluence with California Gulch. Table 1 does show impact to surface water, however, the impact does not come from the Grant/Union Smelter site. Any impact to Surface Water and Groundwater will be addressed in OU12.

5.2.3 Western Zinc Smelter

There are two groundwater monitoring points in the vicinity of the Western Zinc Smelter site. Well BMW-1 is screened in bedrock at a depth of approximately 1,229 to 1,244 feet below ground surface. Piezometer PZ-4 is screened in alluvium at a depth of approximately 125 to 137 feet below ground surface. Groundwater quality in these two wells is consistent with other background monitoring wells, which suggests that smelter waste materials have not adversely affected groundwater at these depths. This is consistent with the SPLP and column leaching tests conducted by MK (1992b) on samples of zinc slag. Test results indicate that metal concentrations in slag leachate do not create a significant contaminant migration pathway at this site.

The Surface Water RI (Golder, 1996b) did not identify any surface water bodies at the Western Zinc Smelter site and no sampling was conducted. Because of the absence of surface water features, it is not expected that smelter-related materials at this site could adversely impact surface water quality in the area. Any impact to Surface Water and Groundwater will be addressed in OU12.

5.2.4 Arkansas Valley South Hillside Slag Pile

The Surface Water RI (Golder, 1996b) did not identify any surface water bodies at the Arkansas Valley South Hillside Slag Pile site and no sampling was conducted. Because of the absence of surface water features, waste at this site is not expected to impact surface water quality in the area. There are no groundwater monitoring wells in the vicinity of the site. Any impact to Surface Water and Groundwater will be addressed in OU12. Although several erosion features that have "cut through" sections of the main slag pile are evident, a review of aerial photographs dating back to 1944 indicate that transport of slag does not appear to be an ongoing condition.

5.3 HISTORIC AND CULTURAL RESOURCES

The cultural resources of OU5 were surveyed in August and September 1995 for Elgin Smelter site and Grant/Union Smelter site (FEC, 1996a) and in June 1996 for Western Zinc Smelter site with the results included as an addendum (FEC, 1996b). The Arkansas Valley South Hillside Slag Pile was not surveyed or evaluated; however, since this site consists solely of slag piles, it is very unlikely that the site contains any features of historical or cultural significance. The Elgin Smelter (5LK893), Grant/Union Smelter (5LK894), and Western Zinc Smelter (5LK924) sites were recommended as not being eligible for National Register of Historic Places (NRHP) and are not contributing features to the Leadville Historic Mining District under NRHP criteria.

6.0 CURRENT AND POTENTIAL FUTURE LAND USE

Land surrounding and within the California Gulch Superfund Site is predominately dedicated to mining, commercial/industrial, and residential uses. The OU5 EGWA sites are located within areas zoned residential, commercial, and industrial. The EGWA sites are currently vacant and may have intermittent recreational visitors. The Grant/Union and Western Zinc Smelter sites are currently zoned residential. It is reasonably anticipated that these two sites may be used for residential. The Elgin Smelter and Arkansas Valley South Hillside Slag Pile sites are currently zoned Business and are not likely to be re-zoned for residential use. Potential future land use is reasonably anticipated to be consistent with the local Business zoning.

The effectiveness of the "overlay district," as well as land use changes, and plans/proposals for future land use at each site, would be monitored and evaluated as part of the five-year review process.

7.0 SUMMARY OF SITE RISKS

Baseline risk assessments (RA) characterize potential human health and ecological risks at a site based on current conditions (i.e., no action taken at the site). Remedial action is driven by the potential for human health or ecological risk; the RA indicates the media and exposure pathways to be addressed. Contaminants, receptors, exposure pathways, and baseline risks at OU5 are described below.

7.1 HUMAN HEALTH RISKS

The following human health RAs are pertinent to OU5:

- Weston. 1991. Preliminary Human Health Baseline Risk Assessment for the California Gulch NPL Site, Leadville, Colorado. Prepared by Roy. F. Weston, Inc. for the EPA. December. (Preliminary RA).
- Weston. 1996a. Baseline Human Health Risk Assessment for the California Gulch Superfund Site, Risk to Residents from Lead (Part A). Prepared by Roy. F. Weston, Inc. for the EPA. January.
- Weston. 1996b. Baseline Human Health Risk Assessment for the California Gulch Superfund Site, Risk to Residents from Contaminants Other Than Lead (Part B). Prepared by Roy. F. Weston, Inc. for the EPA. January.
- Weston. 1995a. Baseline Human Health Risk Assessment for the California Gulch Superfund Site, Part C: Evaluation of Worker Scenario and Evaluation of Recreational Scenarios. Prepared by Roy. F. Weston, Inc. for the EPA. April.

The preliminary RA (Weston, 1991) evaluated residential risks from exposure to contaminated media (i.e., soil, waste rock, tailing, etc). The preliminary RA also evaluated potential risks to workers from future exposure to slag, even though the exposure pathway for lead is incomplete. Since the completion of the preliminary RA, several studies were completed that provided additional data on contaminant concentrations and on human and ecological exposures. Additionally, Leadville officials and business leaders expressed concern over possible risks and liabilities associated with commercial and recreational uses within the Site. The final baseline RA (Weston, 1995a, 1996a, and 1996b) was composed of the following three parts:

- Part A Risk to Residents from Lead- evaluated residential risk from exposure to lead;
- Part B Risk to Residents from Contaminants Other than Lead - evaluated risk to residents from exposure to contaminants other than lead; and
- Part C Evaluation of Recreational Scenarios and Evaluation of Worker Scenario - developed in response to community concerns, presented risk- based action levels to determine whether chemical concentrations presented a risk at locations used for commercial, industrial, or recreational purposes.

The following sections summarize the results of these RAs, including media and contaminants of concern (COC), exposure assessment, and risk characterization, as they relate to OU5.

7.1.1 Media and Contaminants of Concern

Potential media of concern in OU5 includes of slag, non-residential soils, and residential area soils of the EGWA sites. Results of the preliminary RA (Weston, 1991) and the final RA (Weston, 1995a) indicate that human receptors are expected to have minimal exposure to slag. Both the preliminary and final RA indicate that soil is the medium of concern for human exposure. Arsenic and lead were used as indicator contaminants for risk in the final RA (Weston, 1995a). These chemicals were selected based on the results of the preliminary

RA (Weston, 1991), which indicate that lead and arsenic are responsible for the majority of human health risks at the California Gulch Superfund Site.

7.1.2 Exposure Assessment

The EGWA sites are currently vacant. The Elgin Smelter and Arkansas Valley South Hillside Slag Pile sites are currently zoned Business and are not likely to be re-zoned for residential use. Human receptors of concern at the Elgin Smelter and Arkansas Valley South Hillside Slag Pile sites consist of commercial and industrial workers and recreational visitors. The Grant/Union and Western Zinc Smelter sites are currently zoned residential. Human receptors of concern at the Grant/Union and Western Zinc Smelter sites are recreational visitors, and potential future residents.

The preliminary RA identified potential primary sources of metals of concern, the mechanisms of releases to the environment, and receptors in a conceptual site model as shown in Figure 12. A conceptual site model was also created for residential use (specifically, exposure to children) and is shown in Figure 13. The final RA identified soil ingestion as the exposure pathway of concern for recreational visitors; ingestion of soil and dust was identified as the exposure pathway of concern for commercial/industrial workers; and ingestion of soil/dust and waste piles as the exposed pathway of concern for residents. Exposure to other media (e.g., slag piles) and exposure to soil/dust through other pathways (e.g., dermal) are considered of insignificant concern for workers, recreational users and residents (Weston, 1991).

7.1.3 Risk Characterization

The final RA (Weston, 1995a) developed risk-based action levels for lead and other metals. As described above, arsenic and lead are responsible for the majority of human health risk at the California Gulch Superfund Site. The action levels developed in the final RA represent risk-based chemical concentrations, which are protective of human health and can be compared to contaminant concentrations in soil to identify areas of potential concern to commercial/industrial workers, recreational visitors, or residents. The action levels, presented as a range, represent the low and high values calculated based on the uncertainties and variations of the exposure parameters.

For commercial/industrial exposure, the soil action level for lead ranged from as low as 2,200 mg/kg to as high as 19,100 mg/kg, which is based on the widely varying exposure parameters, with central tendency values in the 6,100 to 7,700 mg/kg range. Soil action levels for arsenic based on commercial/industrial exposure ranged from 330 to 1,300 mg/kg, which is based on the widely varying exposure parameters, with central tendency values in the 610 to 690 mg/kg range.

For recreational exposure, the soil action level for lead ranged from as low as 5,000 mg/kg to as high as 85,000 mg/kg, depending on the input parameters. The lead concentration for recreational exposure was 16,000 mg/kg, which is the action level calculated in the RA (Weston, 1995a). For arsenic, soil action levels for recreational exposure ranged from 1,400 to 3,200 mg/kg based on carcinogenic and systemic effects, respectively. The most appropriate arsenic concentration for use as a recreational action level was 1,400 mg/kg, based on the potential for carcinogenic effects.

For residential exposure, the soil action levels are 3,500 mg/kg for lead and 120 to 340 mg/kg for arsenic. The arsenic level is presented as a low and high range because of a number of uncertain parameters (e.g., ingestion rate for soil, ingestion rate for dust, the contribution of soil to dust, the uptake of metals into vegetables, and the ingestion rate of home-grown vegetables).

The action levels are summarized below:

COC	Soil Action Levels, mg/kg		
	Residential	Commercial/Industrial	Recreational
Lead	3,500	6,100 - 7,700	16,000
Arsenic	120 - 340	610 - 690	1,400 - 3,200

Soil sampling data for the EGWA sites are reported for several depth intervals including 0 to 1 inch, 1 to 2 inches, 2 to 6 inches, and 12 to 18 inches. The metals concentrations from the depth intervals less than 6 inches and the weighted average concentrations for the 0 to 6 inch depth interval were compared to the established action levels for various land use scenarios.

At each of the four OU5 EGWA sites, the average concentration of lead and arsenic for all samples at each site (in the 0 to 6 inch depth interval) are below the risk-based action levels established by the EPA for residential use scenario at the California Gulch Superfund Site. However, metals concentrations in soil at several individual sample locations exceed the action levels associated with their current zoning, as described below.

At the Elgin Smelter site (currently zoned commercial/industrial) concentrations of lead and arsenic at one sample location, S09-003 (in the 0 to 6 inch depth interval) in an area within the footprint of the historic slag pile and near the stream channel in Big Evans Gulch have been measured above the site action levels established for the commercial/industrial worker and recreational exposure scenarios.

At the Grant/Union Smelter site (currently zoned residential) concentrations of lead at two sample locations - SGU01 and PG-232 - (in the 0 to 6 inch depth interval) in an area near the existing slag pile and within the footprint of the historic slag pile have been measured above the risk-based site action levels established for residential use scenarios.

At the Western Zinc Smelter site (currently zoned residential) and the Arkansas Valley Smelter South Hillside Slag Pile site (currently zoned commercial/industrial), measured concentrations of lead and arsenic at all sample locations (in the 0 to 6 inch depth interval) are below the risk-based action levels established by the EPA for residential and commercial/industrial use scenarios, respectively. However, one sample (S22-001) at the Western Zinc site exhibits arsenic concentrations, in the 0 to 1 inch depth interval, that exceeds the residential action level.

Because these sites are vacant and the average soil concentrations across each site are well below the risk-based site action levels for a recreational use scenario, which is consistent with current uses, conditions at these sites do not pose current unacceptable risks. One sample location at the Elgin Smelter site has been identified as having lead and arsenic concentrations in soil that exceed the action level for recreational use. The Elgin Smelter site is private property and will be evaluated in 2001 as part of the five-year site review. Under potential future use scenarios, the relatively small areas of soil with lead or arsenic concentrations exceeding their risk-based action levels may present a potential human health risk, depending on the actual development of the site.

7.2 ECOLOGICAL RISKS

Baseline RAs characterizing ecological risks at OU5 consist of:

- Weston. 1995b. Final Baseline Aquatic Ecological Risk Assessment, California Gulch NPL Site. (BARA).

- Weston. 1997. Ecological Risk Assessment for the Terrestrial Ecosystem, California Gulch NPL Site. Leadville, Colorado. (ERA).

The BARA (Weston, 1995b) characterizes the impacts of mine waste contamination on the aquatic ecosystem of the California Gulch Superfund Site. There are no surface water bodies at OU5, and surface water run-off is minimal. The BARA does not evaluate risks associated with OU5. Based on this information, aquatic risks are not discussed further in this document.

Potential risks to the terrestrial ecosystem from mine waste contamination are characterized in the ERA (Weston, 1997). The ERA provides a conceptual site model for terrestrial receptors at the California Gulch Superfund Site and is shown in Figure 14. In the ERA, the potential for adverse effects was evaluated on a station-by-station basis and on an OU basis.

Results of the ERA relating to OU5, including media and contaminants of concern, exposure assessment, and risk characterization, are summarized below.

7.2.1 Media and Contaminants of Concern

The primary COCs identified in the ERA were arsenic, cadmium, copper, lead, and zinc. Metals concentrations were measured in tailing piles, mine waste piles, slag piles, surface soils, surface waters, and fluvial sediments. These media were considered likely pathways of exposure to biological receptors that would or could occur in the upland and/or the wetland areas present in the Leadville area.

OU5 was subdivided into five subunits (A through E) in the ERA as follows: Arkansas Valley Smelter/Colorado Zinc-Lead Mill (OU5A), Arkansas Valley South Hillside Slag Pile (OU5B), Western Zinc Smelter (OU5C), Grant/Union Smelter (OU5D), and the Elgin Smelter (OU5E). Risks to ecological receptors were calculated from exposure to metals in slag and soil in the ERA.

7.2.2 Exposure Assessment

Upland species included mountain bluebird, least chipmunk, blue grouse, American kestrel, and soil fauna. Wetland species included red winged blackbird, long-tailed vole, belted kingfisher, and spotted sandpiper. Species evaluated that would be potential receptors in both habitats included bald eagles, mule deer, red-tailed hawk, and plants.

The exposure pathways evaluated in the ERA consisted of direct exposure to contaminated media, incidental ingestion of contaminated media, and indirect exposure through the food chain. Contaminant intakes for the receptors evaluated were based on exposure assumptions such as food ingestion rates and body weight.

The ERA used the 95 percent upper confidence limit of the arithmetic mean (UCL) of contaminant concentrations in media to evaluate exposure and risks for each OU. If the maximum contaminant concentration was less than the 95 percent UCL, the maximum was used as the exposure point concentration.

7.2.3 Risk Characterization

The ERA reviewed toxicological literature to derive acceptable contaminant intake values for birds and mammals. Resulting benchmark values, referred to as Toxicity Benchmark Values (TBV), were compared to calculated contaminant intakes for ecological receptors. To estimate risks, the ERA divided estimated intake by the TBV to derive a hazard quotient (HQ). Contaminant intakes greater than TBVs (HQ greater than 1) indicated the potential for toxicity to the receptor. Results of the ERA indicated that terrestrial receptors in OU5 could have contaminant intake greater than TBVs. Soils within the OU5 EGWA sites may contribute to potential risks to terrestrial receptors (e.g., the mountain bluebird). However, risks to terrestrial receptors from exposure to metals in soils at the OU5 EGWA

sites are considered moderate to low, and remediation of source area across the California Gulch Superfund Site will reduce exposure to terrestrial receptors.

7.3 SUMMARY OF RISKS/BASIS OF ACTION

The response action selected in this ROD for OU5 EGWA is warranted to protect the public health or welfare or the environment from actual or threatened releases of pollutants or contaminants that may present an imminent and substantial endangerment for potential future use of the sites. Because the OU5 EGWA sites are vacant and the average soil concentrations across each site are well below the risk-based site action levels for a recreational use scenario, which is consistent with current uses, conditions at these sites do not pose current unacceptable risks. One sample location at the Elgin Smelter site has been identified as having lead and arsenic concentrations in soil that exceed the action level for recreational use. The Elgin Smelter site is private property and will be evaluated in 2001 as part of the five- year site review. Under potential future use scenarios, the relatively small areas of soil with lead or arsenic concentrations exceeding their risk-based action levels may present a potential human health risk, depending on the actual development of the site.

8.0 REMEDIAL ACTION OBJECTIVES

This ROD was prepared according to EPA guidance (EPA, 1999). The remedy outlined in this ROD is intended to be the final remedial action for OU5 EGWA sites. The primary objectives of the remedy presented in this ROD are:

Slag

- Control of leaching of metals of concern in concentrations that would have an adverse impact on soils, surface water, or groundwater;
- Control airborne transport of contaminated materials; and
- Control erosion of contaminated materials to prevent deposition into local surface water courses.

Non-residential Area Soils

- Control airborne transport of contaminated materials;
- Control erosion of contaminated materials and deposition into local water courses;
- Control leaching and migration of metals from soil into surface water;
- Control leaching and migration of metals from soil into groundwater; and
- Control contaminant exposure to animals and aquatic life.

Residential Area Soils

- Prevent direct exposure of the population to elevated concentrations of contaminants in the surface soil.

The effectiveness of the remedial action alternatives were evaluated with respect to these RAOs. Remedial actions undertaken within the OU5 EGWA sites are consistent with the remedial action objectives and goals identified for the entire California Gulch Superfund Site.

9.0 DESCRIPTION OF ALTERNATIVES

A wide range of cleanup options were considered in the SFS (EPA, 1993). Some of the alternatives were eliminated during preliminary screening because they would not effectively address contamination, could not be implemented, or would have had excessive costs. Remedial action alternatives for OU5 for slag and non-residential area soils that were retained after screening alternatives from the SFS were evaluated in the FFS (MFG, 1999). All of the alternatives were evaluated using the nine criteria required by the NCP as described in the next section, and then compared with each of the other options.

A brief description of the four clean up alternatives that were considered for the slag, nonresidential area soils, and residential area soil at the OU5 EGWA sites as presented in the FFS (MFG, 1999) and the Proposed Plan (EPA, 2000) is provided below.

Alternative 1: No Action

Estimated capital and operating cost: \$0

Implementation time: Immediate

This alternative leaves the slag, non-residential area soils, and residential area soils in place with no remediation, engineering or institutional controls, or long-term maintenance. Generally, the No Action Alternative is provided for consideration as a baseline against which other technologies can be compared in accordance with the NCP. No Action is not protective of human health and the environment. A site-wide surface and groundwater monitoring program will be developed once all source areas have been addressed. ASARCO would conduct any required monitoring at the slag piles, non-residential area soils, and residential area soils. This alternative is technically feasible and cost-effective since it does not rely on any technology and has no cost.

Alternative 2: Institutional Controls

Estimated capital and operating cost: \$85,496

Implementation time: Immediate

Institutional Controls consists of legal restrictions applied to the sites to restrict access or activities and includes measures to provide information to current and/ or future land owners regarding environmental conditions at the site, and to ensure that if these sites are developed any necessary special precautions or requirements are followed. Lake County and/ or City of Leadville zoning ordinances would be modified to create a zoning "overlay district" to provide a screening process to identify properties where special precautions or requirements may be necessary and a mechanism to notify owners and/or developers of these requirements. The requirements would include conditions that must be met to ensure protectiveness and may require additional sampling or response actions, to be conducted or funded by Asarco, consistent with the development plans.

At the Western Zinc Smelter site (currently zoned Urban Residential) and the Arkansas Valley Hillside Slag Pile site (currently zoned Business), there is no evidence that soil contamination exists in exceedance of established risk-based action levels associated with land use scenarios consistent with the current zoning of these two site. At the Grant/Union (currently zoned Residential) and the Elgin (currently zoned Business) Smelter sites, soil sampling data indicate that while average concentrations of metals in soil (in the 0 to 6 inch depth interval) are below the established risk- based action levels for a residential land use scenario, several small isolated areas exhibit lead and/or arsenic concentrations that exceed the risk-based action levels for residential and commercial/ industrial use scenarios, respectively. As stated previously, all of the OU5 EGWA sites are vacant.

If and when future remediation occurs, ASARCO would conduct or fund the response activities consistent with the procedures and requirements of the Lake County Community

Health Program (LCCHP). These activities would be funded by ASARCO separate from the LCCHP trust fund. As the EGWA sites are developed or zoning changes are implemented, the areas with the elevated metals concentrations would be addressed under the procedures and requirements of the "overlay district." The cost for potential future remediation was not included in the cost estimate for Alternative 2 because of the many uncertainties and unknowns associated with potential future remediation effort. The effectiveness of the "overlay district," as well as land use changes, and plans/proposals for future land use at each site, would be monitored and evaluated as part of the five-year review process.

Alternative 3: No Action for Slag; Containment (Source Surface Control) for Non-Residential Area Soils and Residential Area Soils; and Institutional Controls

Estimated capital and operating cost: \$151,714

Implementation time: Immediate

This alternative entails leaving slag in place. Soil covers (for containment) would be placed over those areas that have elevated lead or arsenic concentrations in non-residential and residential area soils exceeding the risk-based action levels. Soil covers would be required at the Elgin and Grant/Union Smelter sites. For the purpose of the FFS and ROD, the areas where soil would be covered are each 100 feet long by 100 feet wide. A simple cover of 12 inches of clean borrow soil, compacted in place, would prevent exposure to the soil by reducing the potential for direct contact and reduce surface water contact and infiltration. Revegetation of the cap would reduce erosion due to surface water runoff, prevent the entrainment and transport of dust/particles by wind, and further reduce infiltration.

Institutional controls, as described in Alternative 2, would be implemented in the cover areas to prohibit activities that might compromise the remedy. Controls would include: (1) land use restrictions and requirements for the soil cover areas and (2) prohibition of activities that would compromise the integrity of the soil cover. The effectiveness of the "overlay district," as well as land use changes, and plans/proposals for future land use at each site, would be monitored and evaluated as part of the five-year review process.

Alternative 4: No Action for Slag; Removal/Transport/Disposal of Non-Residential Area Soils and Residential Area Soils to an On-Site Repository; and Institutional Controls

Estimated capital and operating cost: \$181,668

Implementation time: Immediate

This alternative entails leaving slag in place. The elevated lead or arsenic concentrations in nonresidential area and residential area soils that may pose a potential human health concern at the Elgin and Grant/Union Smelter sites would be removed (to a depth of 2 feet), transported and disposed at an on-site repository. The removal action levels for the Elgin and Grant/Union Smelter sites would be based on future land use, which would be residential and commercial/industrial, respectively. Because of the volume of materials is not well quantified, for the purpose of the FFS and ROD, it is estimated that the extent of excavations at the Elgin and Grant/Union Smelter sites would each be 100 feet long by 100 feet wide by 2 feet deep (i.e., approximately 740 cubic yards). Disposal would be at the Arkansas Valley Smelter site, Apache Tailing Impoundments (which is part of OU7), or an on-site repository to be developed for OU9 residential soils. The excavated areas would be backfilled with clean soil.

Soils above action levels may still remain because the extent of removal is limited to a 2 foot depth. Institutional controls, such as the proposed "overlay district" would apply to all areas of the EGWA sites. Additional soil sampling or other activities may be required, which would be conducted or funded by Asarco, in order to be consistent with the development plans. The cost for potential future remediation was not included in the cost estimate for Alternative 4 because of the many uncertainties and unknowns associated with potential future remediation effort. The effectiveness of the "overlay district," as well as land use changes, and plans/proposals for future land use at each site, would be monitored and evaluated as part of the five-year review process.

10.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 300.430(e)(9) of the NCP requires that the EPA evaluate and compare the remedial cleanup alternatives based on the nine criteria listed below. The first two criteria, (1) overall protection of human health and the environment and (2) compliance with applicable or relevant and appropriate requirements (ARAR), are threshold criteria that must be met for the Selected Remedy. The Selected Remedy must then represent the best balance of the remaining primary balancing and modifying criteria.

10.1 NCP EVALUATION AND COMPARISON CRITERIA

10.1.1 Threshold Criteria

1. Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/ or Institutional Controls.
2. Compliance with ARARs addresses whether or not a remedy will comply with identified federal and state environmental and citing laws and regulations.

10.1.2 Primary Balancing Criteria

3. Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain on site following remediation and the adequacy and reliability of controls.
4. Reduction of toxicity, mobility, and volume through treatment refers to anticipated performance of the treatment technologies that may be included as part of a remedy.
5. Short-term effectiveness addresses the period of time needed to complete the remedy and any adverse impact on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.
6. Implementability refers to the technical and administrative feasibilities of a remedy, including the availability of materials and services needed to carry out a particular option.
7. Cost evaluates the estimated capital costs, operation and maintenance (O&M) costs, and present worth costs of each alternative.

10.1.3 Modifying Criteria

8. State acceptance indicates whether the State (CDPHE), based on its review of the information, concurs with, opposes, or has no comment on the preferred alternative.
9. Community acceptance is based on whether community concerns are addressed by the Selected Remedy and whether or not the community has a preference for a remedy.

10.2 EVALUATING THE ALTERNATIVES WITH THE NCP CRITERIA

The section summarizes the evaluation and comparison of the OU5 EGA alternatives against the nine NCP criteria. The following subsections are a brief summary of the evaluation and comparison of the OU5 EGWA alternatives against each criteria. Additional details evaluating the alternatives are presented in the FFS. Table 2 provides a comparison of the nine remedial action alternatives and the nine NCP criteria. Information for this section was obtained from the Final FFS OU5 EGWA Sites (MFG, 1999) and the

10.2.1 Overall Protection of Human Health and the Environment

This criterion is based on the level of protection of human health and the environment afforded by each alternative. As shown in Table 2, Alternatives 2, 3, and 4 would meet the RAOs. All of the alternatives would control airborne transport, erosion, and metals leaching from contaminated materials because no significant pathway for transport of constituents from slag or soil to other environmental media have been identified (MFG, 1999). Alternatives 3 and 4 would provide addition benefit by eliminating the potential for airborne transport, erosion, and metals leaching from contaminated materials.

All of the alternatives would control contaminant exposure to animals and aquatic life because the potential risks to the terrestrial receptors through direct contact of certain sources at OU5 are considered low. Alternatives 3 and 4 would provide incremental reduction in risk through elimination of direct contact of limited sources.

Since the EGWA sites are currently vacant and may have only intermittent recreational use, Alternatives 1 and 2 would prevent any significant direct exposure of the population to elevated concentration of contaminants in the surface soil because the average metals concentrations in soil do not exceed risk-based action level for recreational use. One sample location at the Elgin Smelter site has been identified as having lead and arsenic concentrations in soil that exceed the action level for recreational use. The Elgin Smelter site is private property and will be evaluated in 2001 as part of the five-year site review. Alternatives 3 and 4 would provide additional protection under current land use by reducing the potential risk associated with the isolated areas of soil with elevated metals concentrations. Under future land use, Alternative 1 (no action) may result in unacceptable exposure. The institutional controls in Alternatives 2, 3, and 4 would maintain protectiveness under future land use.

Alternative 1 would not provide overall protection of public health and the environment because though slag, non-residential area soils, and residential area soils in their existing condition are not considered a source of environmental or human health risk, this alternative would not ensure protection under potential future land use. All of the alternatives, except Alternative 1 (No Action), would provide adequate protection of human health and the environment. Alternative 2 would provide additional protection because institutional controls would help ensure protection under future land use. Alternatives 3 and 4 would provide minimal additional benefit under current site conditions and land uses by isolating and removing areas of soil with elevated metals concentrations, respectively.

10.2.2 Compliance with Applicable or Relevant and Appropriate Requirements

This criterion is based on compliance with chemical-, location-, and action-specific ARARs. ARARs are presented in Tables 3 through 5. Alternatives 2, 3, and 4 would comply with all ARARs.

10.2.3 Long-Term Effectiveness and Permanence

Under future use scenarios, Alternative 2 would provide long- term protection and permanence using the institutional controls, which would rely on the success of the "overlay district" and would require some administrative maintenance and review. Alternative 3 would provide additional long-term protection through isolation at the Elgin and Grant/ Union Smelter sites. Alternative 4 would provide the greatest long- term protection through removal at the Elgin and Grant/Union Smelter sites. Institutional controls would still be required in Alternative 3 to protect the containment barrier (i.e., soil cover) and in Alternative 4 because the removal activities would be limited. If the response activities for Alternative 3 and 4 were performed in advance of development, these activities may not correspond to the ultimate use or configuration of the land under developed site conditions. Alternative 3 and 4 would require some level of inspection and maintenance to achieve permanence.

10.2.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

No treatment processes are being considered to reduce toxicity, mobility, or volume of slag, non-residential area soils, or residential area soils.

10.2.5 Short-Term Effectiveness

The short-term effectiveness, based on disturbance during implementation, would be good for Alternatives 3 and 4, but Alternative 4 would pose a greater short-term risk during the transportation of contaminated materials. Alternatives 1 and 2 would not have any disturbance.

10.2.6 Implementability

All alternatives would be relatively easy to implement. Lake County and the City of Leadville have agreed to implement the institutional controls in the form of the "overlay district," as described in Alternatives 2, 3, and 4. In addition, institutional controls for Alternatives 2, 3, and 4 would be easy to implement because Asarco would help fund the "overlay district" and fund any potential screening (e.g., soil sampling) and remediation. Alternatives 3 and 4 would require more time and effort to implement compared to Alternative 2 because the areas with elevated metals concentrations have not been specifically quantified. However, Alternatives 3 and 4 could probably still be performed in one construction season with conventional construction equipment.

10.2.7 Cost

This criterion evaluates the estimated capital, O&M, and present worth costs of each alternative. Present worth costs range from zero (Alternative 1) to \$181,668 (Alternative 4). The present worth of post-removal site control costs for a 30-year period were calculated assuming a 5 percent discount rate.

10.2.8 State Acceptance

The State has been consulted throughout this process. The State is aware of EPA's selected remedy and has chosen to make no further comment.

10.2.9 Community Acceptance

Public comment on the RI/FS and Proposed Plan was solicited during a formal public comment period extending from July 27 to August 28, 1999. No comments from the community were received during the formal public comment period.

11.0 PRINCIPAL THREAT WASTES

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by the site wherever practicable (NCP §300.430(a)(1)(iii)(A)). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied.

The source materials identified at the OU5 EGWA site include slag, non-residential area soils, and residential area soil. These source materials do not constitute principal threat wastes; hence, they are considered non-principal threat wastes.

12.0 SELECTED REMEDY

Based upon consideration of CERCLA requirements, the detailed analysis of alternatives, and public comments, EPA has determined that the Institutional Controls alternative presented in the Proposed Plan, with no modifications, is the appropriate remedy for the slag, non-residential area soils, and residential area soils at the OU5 EGWA sites within the California Gulch Superfund Site. Lake County and/or City of Leadville zoning ordinances will be modified to create a zoning "overlay district" to provide a screening process to identify properties where special precautions or requirements may be necessary and a mechanism to notify owners and/or developers of these requirements. Any sampling or response actions will be conducted or funded by Asarco, consistent with the development plans.

The Institutional Controls alternative is protective of human health and the environment and is considered effective because slag in its existing condition does not present a significant risk to human health or the environment. In addition, no significant pathways for transport of COCs from non-residential and residential area soils or other environmental media have been identified and average metals concentrations in soil at each site are well below the risk-based site action levels for recreation use scenario, which is consistent with current uses. The "overlay district," under potential future use scenarios, will ensure that any necessary precautions or requirements are followed for those relatively small areas of soil with lead or arsenic concentrations exceeding their risk-based action levels, which may present a potential human health risk.

12.1 RATIONALE FOR SELECTED REMEDY

Based upon consideration of the requirements of CERCLA and the NCP, the detailed analysis of alternatives, and public comments, EPA has determined that Alternative 2 - Institutional Controls presented in the Proposed Plan is the appropriate remedy for the slag, non-residential area soils, and residential area soils within the OU5 EGWA sites. Alternative 2 either meets or exceeds benefits associated with the selecting criteria compared to the majority of the other alternatives. The approach for waste left in place as described in Alternative 2 is consistent with the approach used in the LCCHP and other areas within the California Gulch Superfund Site where waste was left in place. Institutional controls would still be required for Alternatives 3 and 4 because Alternative 3 involves a soil cover barrier and the removal activities for Alternative 4 would be limited. Alternative 2 is less expensive than Alternatives 3 and 4. This selected remedy will reduce risk to human health and the environment through the following:

- As required, Alternative 2 meets the threshold cleanup evaluation criteria (overall protection of human health and the environment and compliance with ARARs).
- Under Alternative 2, potential risks to human health and the environment would be controlled through implementation of sampling or appropriate response actions consistent with the development of a site.
- Alternative 2 would be permanent and provide long-term effectiveness consistent with future post-development site conditions and land use.

The Selected Remedy best meets the entire range of selection criteria and achieves, in EPA's determination, the appropriate balance considering site-specific conditions and criteria identified in CERCLA and the NCP, as provided in Section 13.0, Statutory Determinations.

12.2 DESCRIPTION OF SELECTED REMEDY

Institutional Controls will be established as the Selected Remedy to warn of potential hazards and to maintain the effectiveness of the remedy by limiting access to or use of the property (current and potential future land use scenarios), including temporary and

permanent measures.

Institutional Controls involve restricting access or activities that could result in human contact with the slag, non-residential area soils and residential area soils or increase the potential for leaching from the slag piles, non-residential area soils, and residential area soils. This alternative includes measures to provide information to current and/or future land owners regarding environmental conditions at the site, and to ensure that if these sites are developed any necessary special precautions or requirements are followed. Lake County and/or City of Leadville zoning ordinances will be modified to create a zoning "overlay district" to provide a screening process to identify properties where special precautions or requirements may be necessary and a mechanism to notify owners and/or developers of these requirements. The requirements will include conditions that must be met to ensure protectiveness and may require additional sampling or response actions, to be conducted or funded by Asarco, consistent with the development plans. Any sampling or response actions will be conducted or funded by Asarco, consistent with the development plans. As the EGWA sites are developed or zoning changes are implemented, the areas with the elevated metals concentrations will be addressed under the procedures and requirements of the "overlay district." The effectiveness of the "overlay district," as well as land use changes, and plans/proposals for future land use at each site, will be monitored and evaluated as part of the five-year review process. EPA, upon consultation with CDPHE, will review and approve proposed response activities.

At the Western Zinc Smelter site (currently zoned Urban Residential) and the Arkansas Valley Hillside Slag Pile site (currently zoned Business), there is no evidence that soil contamination exists in exceedance of established risk-based action levels associated with land use scenarios consistent with the current zoning of these two site. At the Grant/Union (currently zoned Residential) and the Elgin (currently zoned Business) Smelter sites, soil sampling data indicate that while average concentrations of metals in soil (in the 0 to 6 inch depth interval) are below the established risk-based action levels for a residential land use scenario, several small isolated areas exhibit lead and/or arsenic concentrations that exceed the risk-based action levels for residential and commercial/industrial use scenarios, respectively. As stated previously, all of the OU5 EGWA sites are currently vacant.

Proposed controls for the Grant/Union and Western Zinc Smelter sites, which are currently zoned residential and essentially surrounded by OU9, will involve including these sites in the overlay district. If and when future remediation occurs, Asarco will conduct or fund the response activities, consistent with the procedures and requirements of the LCCHP. These activities would be funded by Asarco separate from the LCCHP trust fund.

The Elgin Smelter and Arkansas Valley South Hillside Slag Pile sites are located in the Lake County business zoning district (commercial/industrial use) and are not likely to be re-zoned for residential use. If the Elgin Smelter site, in the future, was included in an area of proposed development, incidental construction activities may adequately contain/cover impacted soil or reduce constituent concentrations in the upper soil layer, thereby reducing risks associated with incidental soil ingestion. A deed notice or formal notification to the property owner will be considered for the Elgin Smelter site to provide available site characterization information to the owner for consideration in planning future development.

An O&M program will be developed. O&M activities will involve creation and maintenance of the "overlay district" for the institutional control.

12.3 ESTIMATED REMEDY COSTS

The detailed cost estimate and present worth analysis for Alternative 2, the Selected Remedy, are presented in Tables 6 and 7, respectively. The net present value of the estimated capital and operating cost for a 30-year period is approximately \$85,496. The cost for a response action of this nature would include administrative expenses to obtain zoning and/or deed restrictions. Costs for future response actions, if any, are not

included in this estimate because of the many uncertainties. These future response actions, if any, will be funded by Asarco. The Selected Remedy is anticipated to be implementable immediately upon finalization of the overlay district. The information in this cost estimate table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Difference, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

12.4 EXPECTED OUTCOME OF THE SELECTED REMEDY

Since the EGWA sites are currently vacant with only intermittent recreation use, institutional controls will be relied upon for future development and land use to maintain the protection of human health and the environment. As the EGWA sites are developed or zoning changes are implemented, the areas with the elevated metals concentrations will be addressed under the procedures and requirements of the "overlay district." If and when future remediation occurs at the Grant/Union and Western Zinc Smelter sites, which are currently zoned residential, Asarco will conduct or fund the response activities consistent with the procedures and requirements of the LCCHP. These activities will be funded by Asarco separate from the LCCHP trust fund.

13.0 STATUTORY DETERMINATIONS

Under CERCLA Section 121, EPA must select a remedy that is protective of human health and the environment, that complies with ARARs, is cost effective, and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that include treatment which permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element.

The following sections discuss how the Selected Remedy meets statutory requirements.

13.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The Selected Remedy is protective of human health and the environment, and is considered effective because (1) slag in its existing condition does not present a significant risk to human health or the environment, (2) no significant pathways for transport of COCs from soil or other environmental media have been identified, and (3) the EGWA sites are currently vacant; however, the sites may be intermittently used for recreation. One sample location at the Elgin Smelter site has been identified as having lead and arsenic concentrations in soil that exceed the action level for recreational use. The Elgin Smelter site is private property and will be evaluated in 2001 as part of the five-year site review, and (4) as the land use changes, the institutional controls will ensure that waste left in place will be addressed to prevent exposure to human health.

The Selected Remedy would control airborne transport, erosion, and metals leaching from contaminated materials because no significant pathway for transport of constituents from slag or soil to other environmental media have been identified (MFG, 1999). In addition, the Selected Remedy would control contaminant exposure to animals and aquatic life because the potential risks to the terrestrial receptors through direct contact of certain sources at OU5 are considered low. Under current land use, The Selected Remedy would prevent direct exposure of the population to elevated concentration of contaminants in the surface soil because the average metals concentrations in soil do not exceed risk-based action level for recreational use. The Selected Remedy would maintain protectiveness under future land use.

13.2 COMPLIANCE WITH ARARs

The Selected Remedy will comply with all ARARs identified in Tables 3, 4, and 5. No waiver of ARARs will be necessary. Final performance standards will not include ARARs for Site-wide Surface Water and Groundwater or require a specified decrease in point or non-point source loadings of COCs to Site-wide Surface Water and Groundwater (USCD, 1994). It was agreed that the decision on remediation of Site-wide Water Quality (OU12) would be made between the EPA and the PRPs and memorialized in the CD only after remedies for source remediation were selected and implemented at each OU. As a result, specific water quality goals for surface streams and groundwater have not been established at this time.

13.3 COST EFFECTIVENESS

EPA has determined that the Selected Remedy is cost effective in mitigating the principal risks posed by slag, non-residential area soils, and residential area soils. Section 300.430(f)(ii)(D) of the NCP requires evaluation of cost effectiveness. Overall effectiveness is determined by the following three balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost effective. The Selected Remedy meets the criteria and provides for overall effectiveness in proportion to its cost. The estimated cost for the Selected Remedy is \$85,496.

13.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES (OR RESOURCE RECOVERY TECHNOLOGIES) TO THE MAXIMUM EXTENT POSSIBLE

No remedial action is necessary to ensure protection of human health and the environment. Institutional controls allow for management of the site if the land use changes. Moreover, since the slag, non-residential area soils, and residential area soils will remain on site with no treatment, the Selected Remedy will require a five-year review under Section 121(c) of CERCLA and Section 300.430(f)(4)(ii) of the NCP.

13.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

Various treatment options for slag, non- residential area soils, and residential area soils were considered in the FS process; however, due to the nature and size of the slag, non- residential area soils, and residential area soils, these options were determined to be either technically impracticable and/ or not cost effective (EPA, 1993).

13.6 FIVE-YEAR REVIEW REQUIREMENTS

Because the slag, non-residential area soils, and residential area soils will remain on site, the Selected Remedy will require a five-year review under Section 121(c) of CERCLA and Section 300.430(f)(4)(ii) of the NCP. The five-year review includes a review of all monitoring data and an evaluation as to how well the Selected Remedy is achieving the RAOs and ARARs that it was designed to meet.

14.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for slag, non-residential area soils, and residential area soils at the OU5 EGWA sites was released for public comment in July 2000. The Proposed Plan identified Alternative 2, Institutional Controls, as the preferred alternative. Comments were received during the public comment period. EPA determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary or appropriate.

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FIGURES

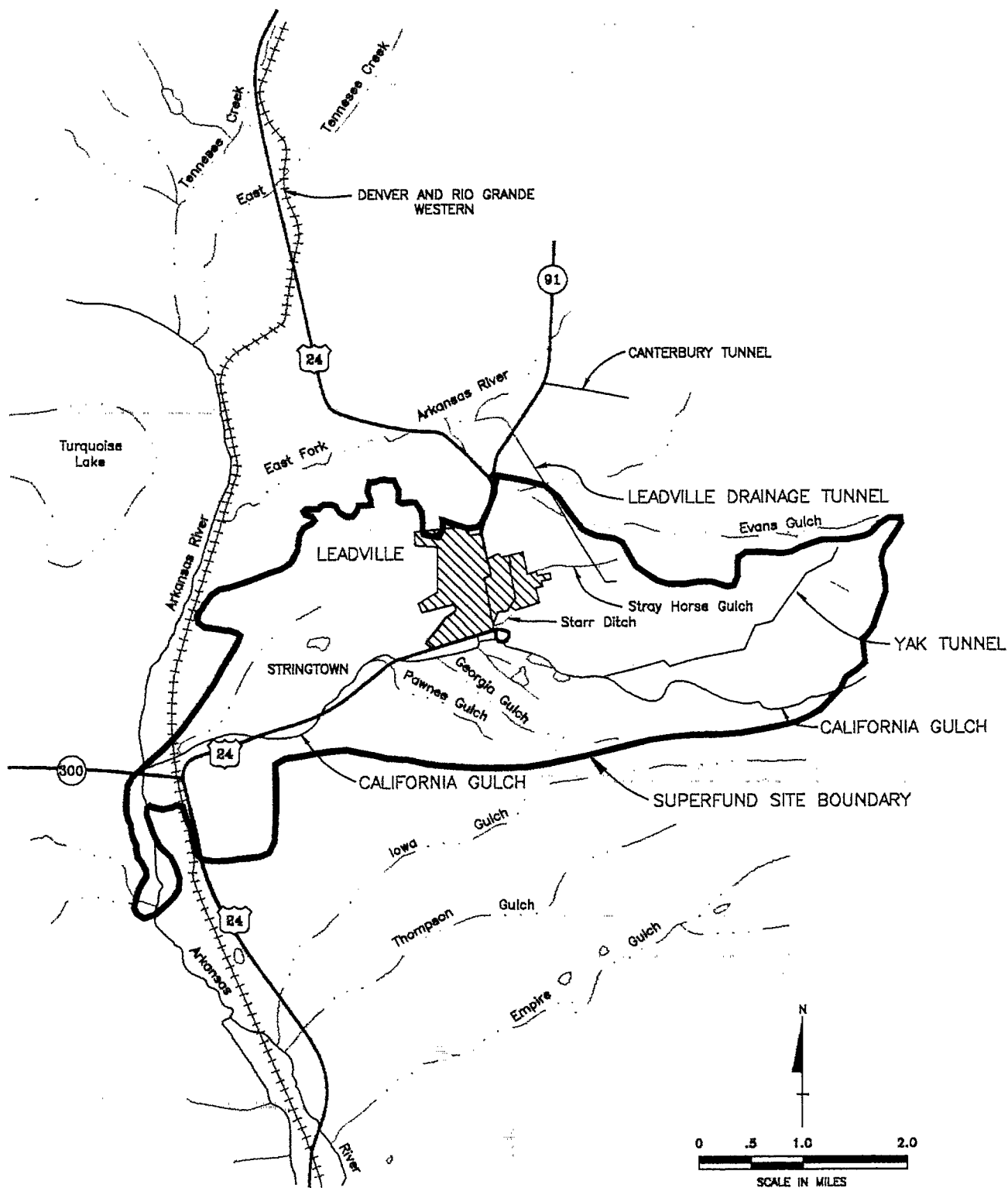
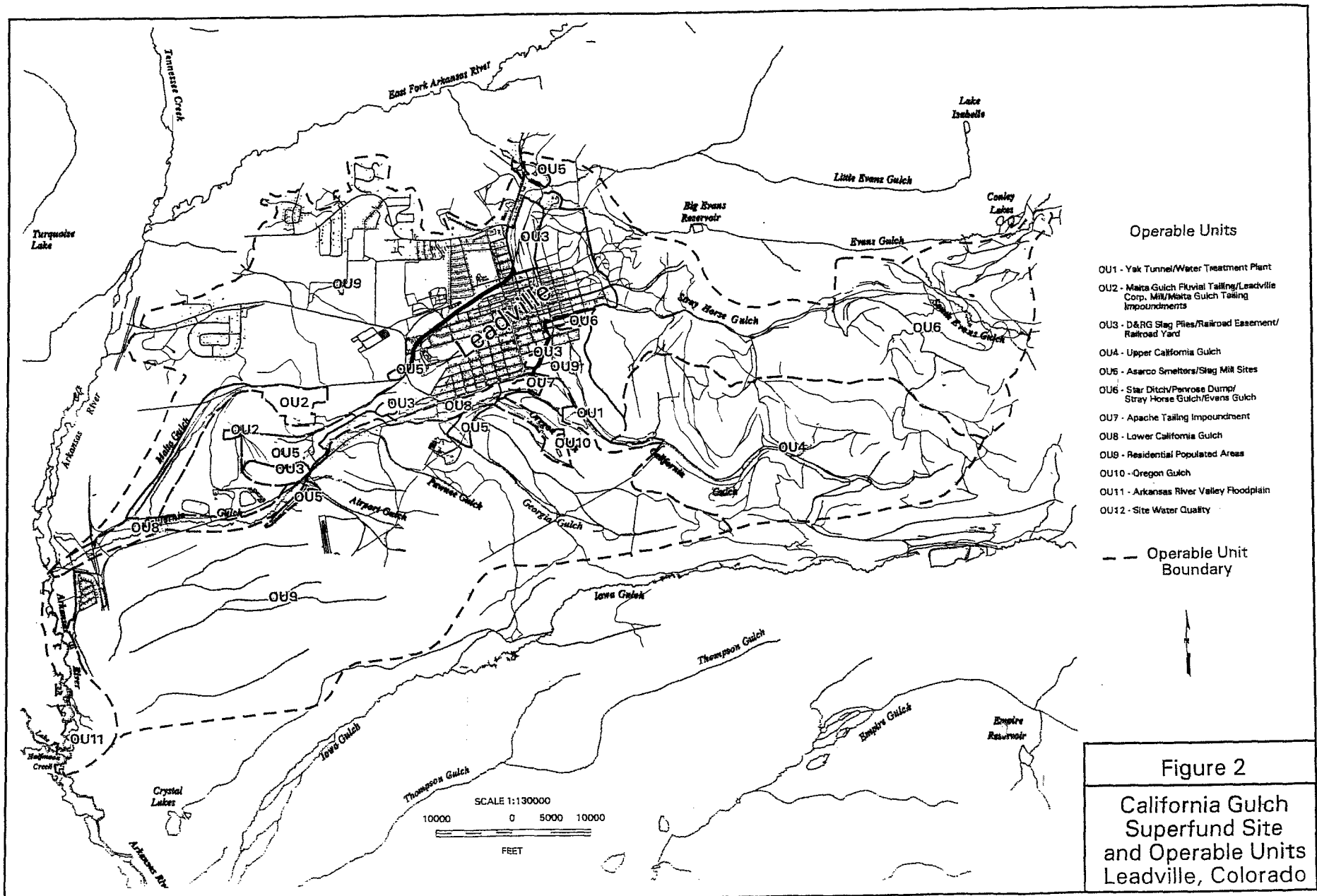


Figure 1

**GENERAL SITE
LOCATION MAP**

**California Gulch Superfund Site
Leadville, Colorado**



LEGEND

— APPROXIMATE OU5 EGWA
SITE BOUNDARIES

▲ FORMER SMELTER SITE

— STREAM/DRAINAGE

--- DIRT ROAD

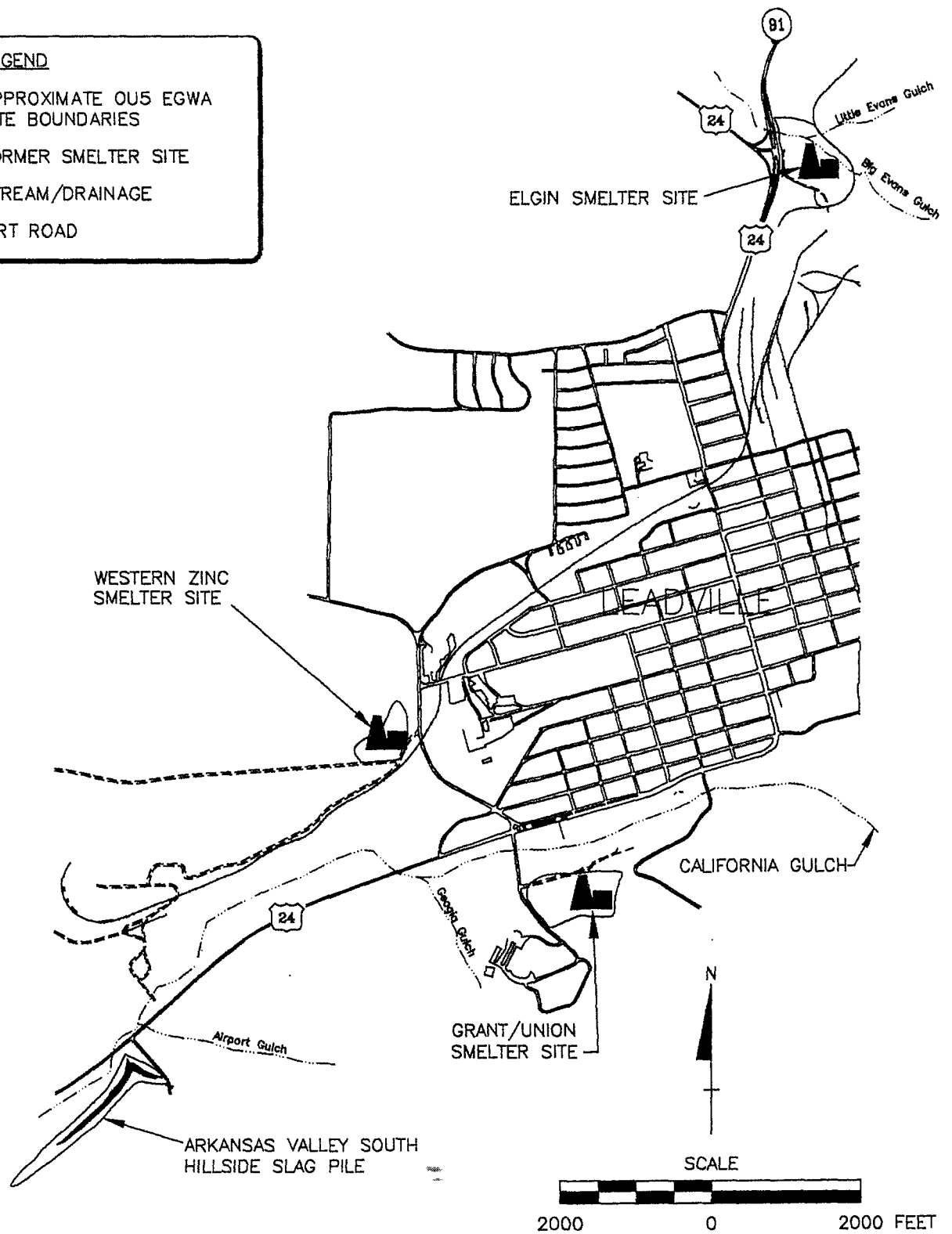


Figure 3

**SITE MAP
OPERABLE UNIT 5 EGWA SITES**

**California Gulch Superfund Site
Leadville, Colorado**

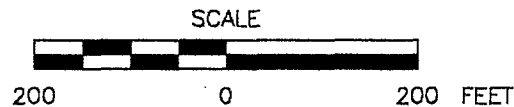
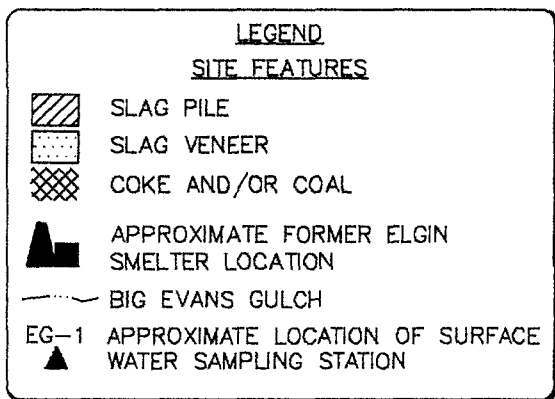
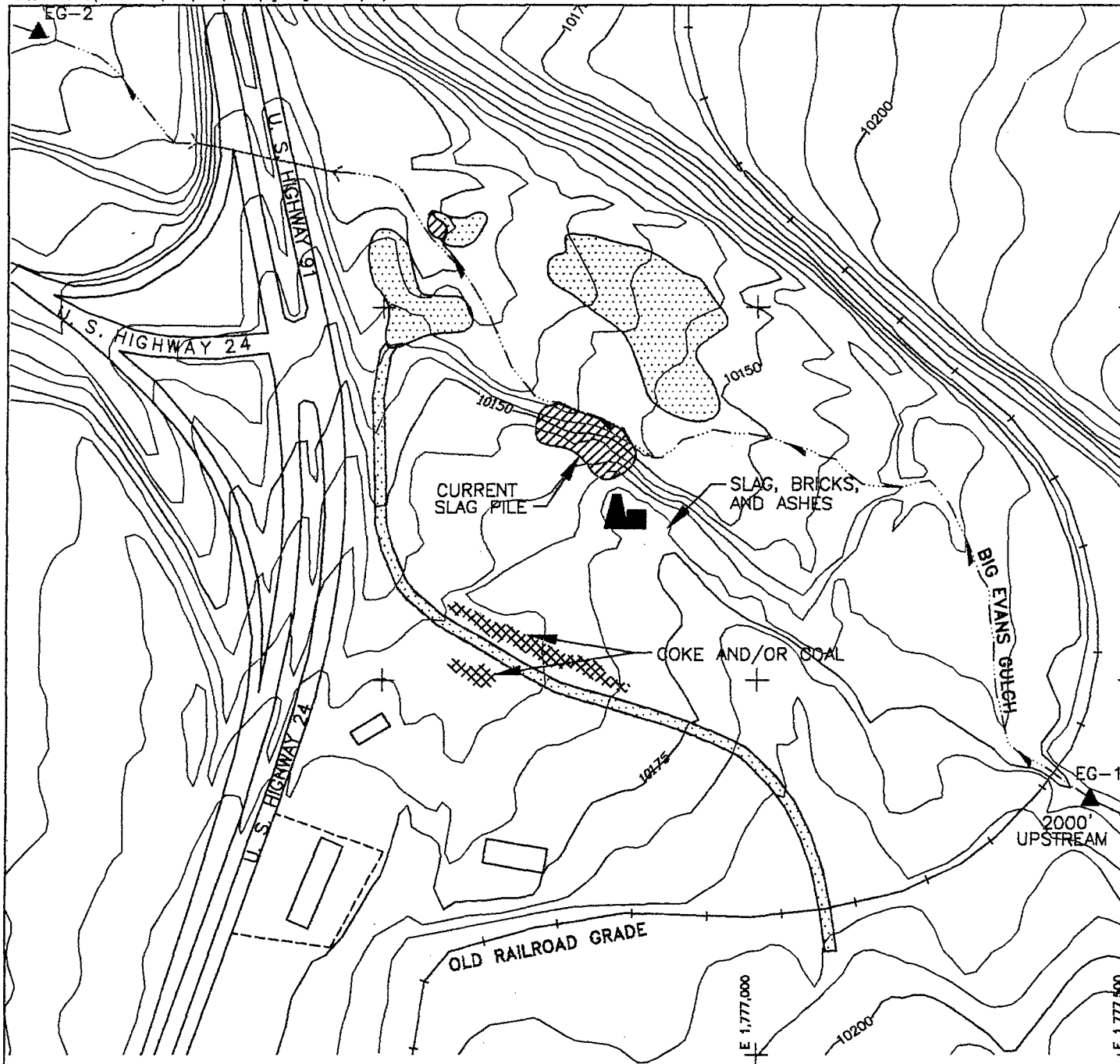
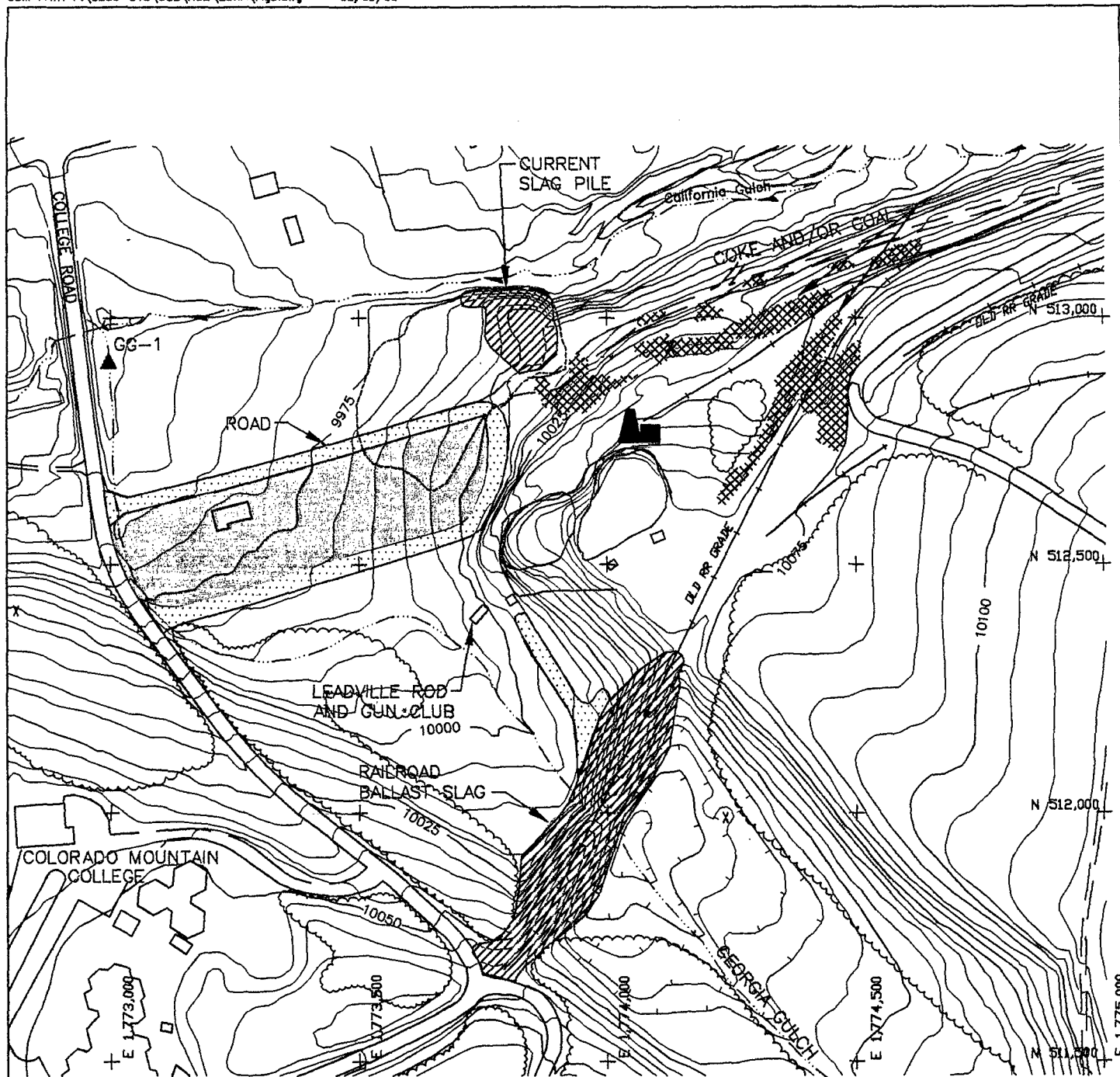


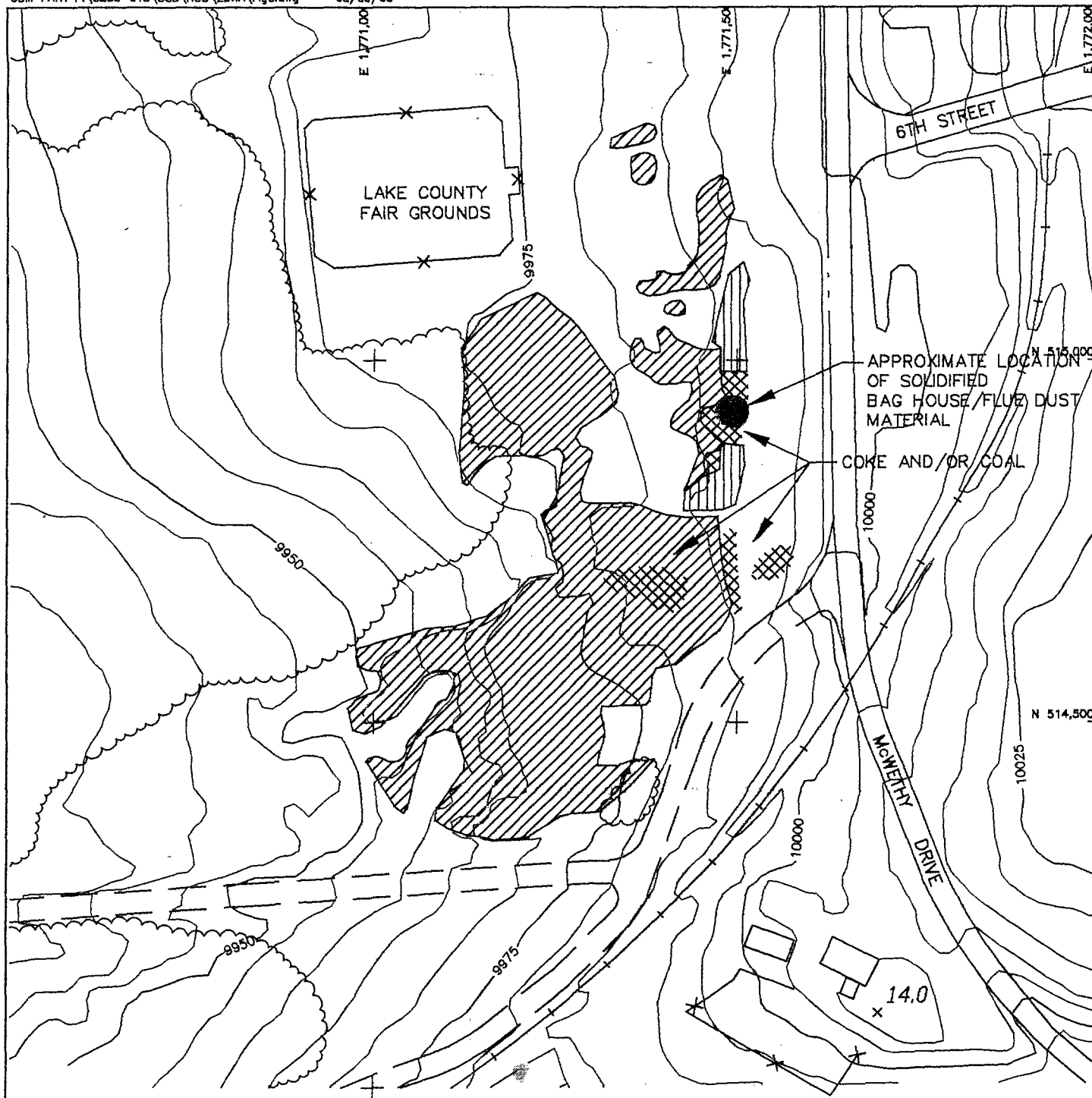
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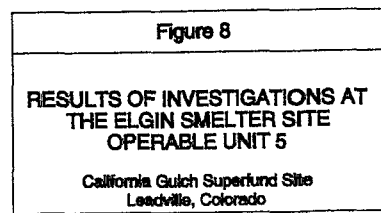
**ELGIN SMELTER LOCATION
AND SITE FEATURES
OPERABLE UNITS**

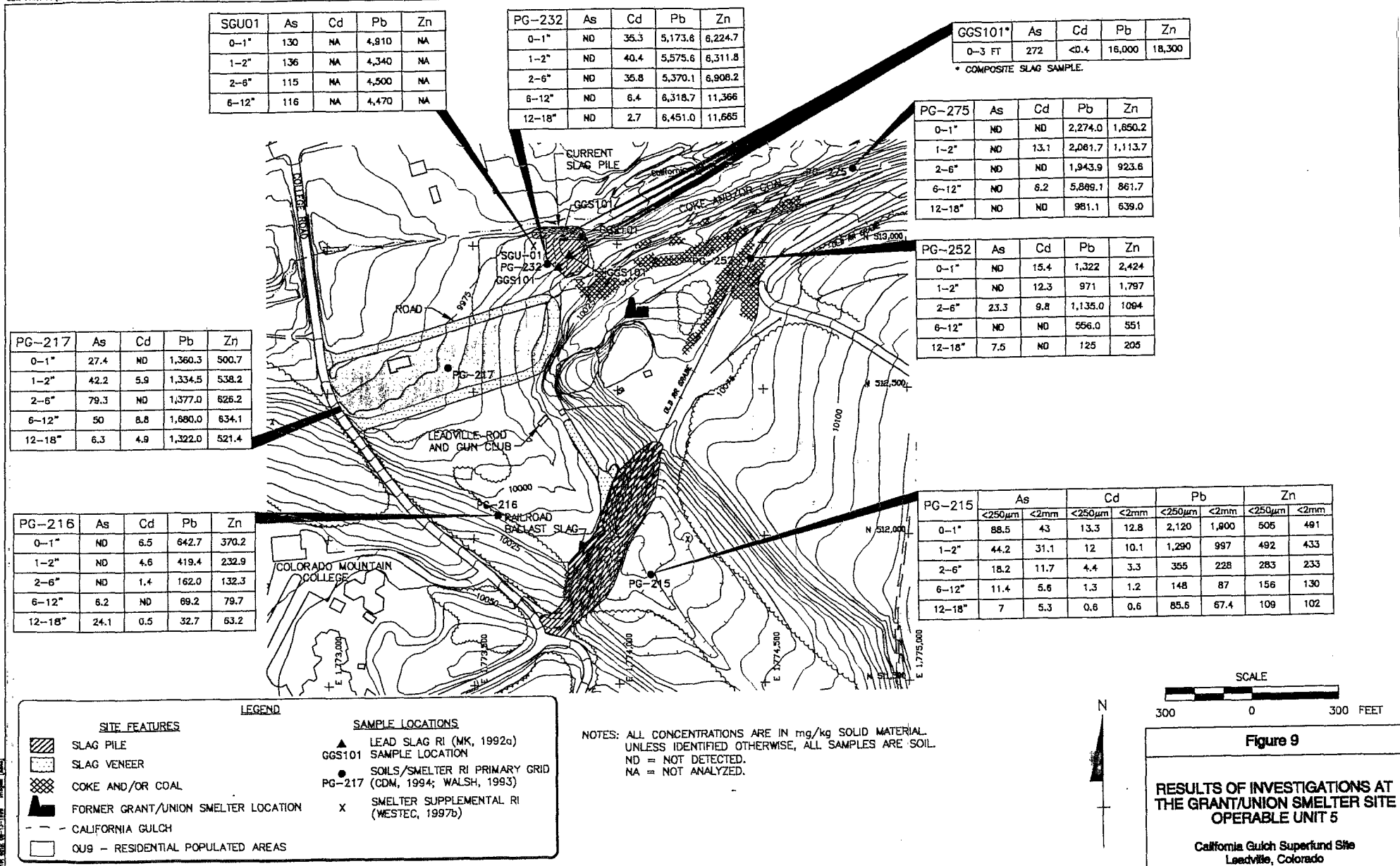
California Gulch Superfund Site
Leadville, Colorado

* SOURCE: MK, 1992a.









* SOURCE: NK, 1992a.

HSS104*	As	Cd	Pb	Zn
0-3 FT	112	18.9	793	67,800

* COMPOSITE SLAG SAMPLE.

HSS101*	As	Cd	Pb	Zn
0-3 FT	414	29.5	739	63,200

* COMPOSITE SLAG SAMPLE.

HSS102*	As	Cd	Pb	Zn
0-3 FT	277	28.6	925	63,300

* COMPOSITE SLAG SAMPLE.

PG-223	As	Cd	Pb	Zn
0-1"	130.2	ND	794.2	8,366.6
1-2"	25.9	20.5	600	4,911.8
2-6"	31.9	22.6	717.2	4,706.7
6-12"	8.4	ND	121.4	873.4
12-18"	4.9	4.14	23.5	426.7

HSS103*	As	Cd	Pb	Zn
0-3 FT	154	25	192	70,000

* COMPOSITE SLAG SAMPLE.

PG-208	As	Cd	Pb	Zn
0-1"	ND	19.6	1,481.0	2,116.0
1-2"	ND	15.7	1,423.7	2,024.5
2-6"	ND	ND	1,529.5	2,016.9
6-12"	ND	13.6	1,435.3	2,126.5
12-18"	ND	13.5	1,342.7	1,742.5

S22-002	As		Cd		Pb		Zn	
	<250µm	<2mm	<250µm	<2mm	<250µm	<2mm	<250µm	<2mm
0-1"	71	112	30	20	410	295	6,765	5,483
1-2"	58	83	31	19	214	139	7,005	4,444
2-6"	75	54	12	7	135	29	3,606	2,257
6-12"	72	83	6	4	319	139	2,158	4,444

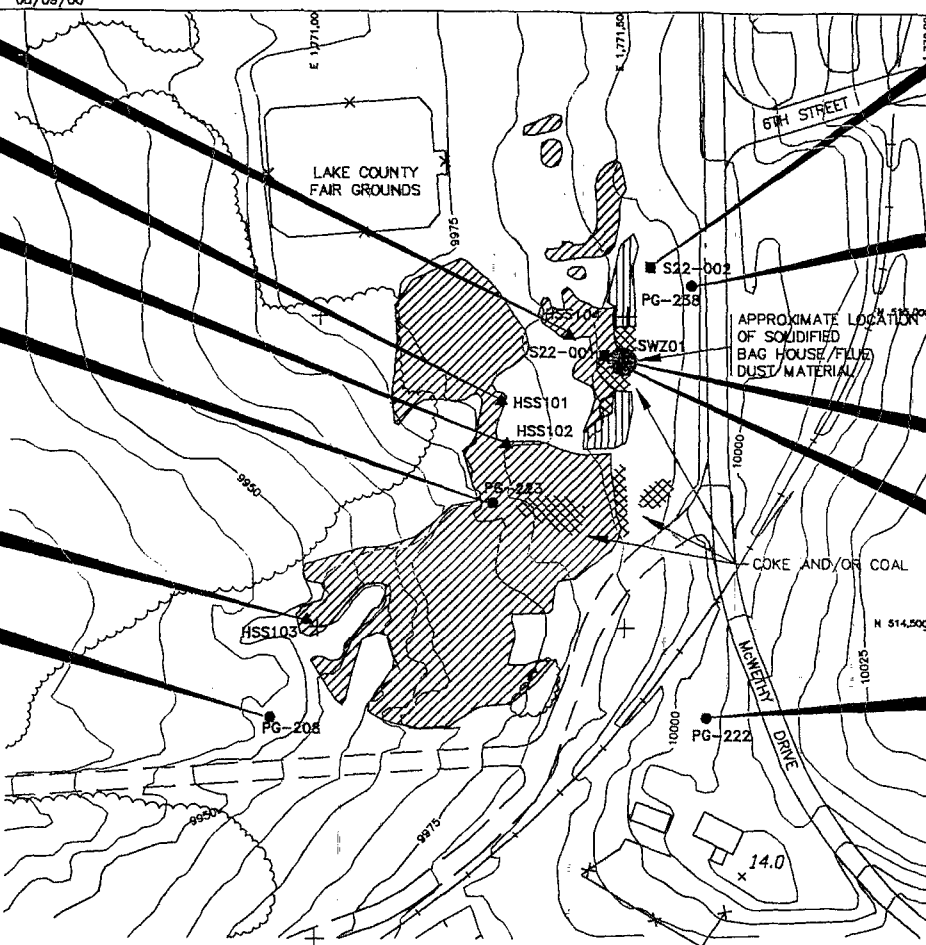
PG-238	As	Cd	Pb	Zn
0-1"	627	4.8	2,271.3	14,342.6
1-2"	125.7	15.1	1,481.2	5,637.5
2-6"	ND	6.6	489.8	1,572.7
6-12"	14.5	ND	213	245.1
12-18"	1.9	ND	186	222.3

SWZ01*	As	Cd	Pb	Zn
GRAB	60	41	260	5,100

* SAMPLE OF POTENTIAL FLUE DUST MATERIAL.

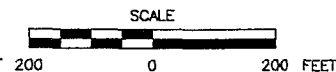
S22-001	As		Cd		Pb		Zn	
	<250µm	<2mm	<250µm	<2mm	<250µm	<2mm	<250µm	<2mm
0-1"	261	107	287	146	2,415	941	53,493	30,213
1-2"	245	142	333	207	1,923	923	63,360	40,629
2-6"	136	164	229	175	1,112	929	37,966	32,758
6-12"	122	106	44	37	536	276	11,749	8,795

PG-222	As	Cd	Pb	Zn
0-1"	ND	ND	251.5	740.1
1-2"	3.3	ND	82.9	166.1
2-6"	5.85	1.9	105.6	164.5
6-12"	11.6	4.4	415.6	839.4
12-18"	ND	ND	296.3	471.1



SITE FEATURES		LEGEND	
	SLAG PILE		ZINC SLAG RI (MK, 1992b)
	SMELTER DEBRIS AREA		HSS101 SAMPLE LOCATION
	COKE AND/OR COAL		PG-222 SOILS/SMELTER RI PRIMARY GRID (CDM, 1994; WALSH, 1993)
			S22-002 SOILS/SMELTER RI DISCRETE (CDM, 1994; WALSH, 1993)
			SWZ01 SMELTER SUPPLEMENTAL RI (WESTEC, 1997b)

NOTES: ALL CONCENTRATIONS ARE IN mg/kg SOLID MATERIAL.
UNLESS IDENTIFIED OTHERWISE, ALL SAMPLES ARE SOIL.
ND = NOT DETECTED.



SCALE

Figure 10

RESULTS OF INVESTIGATIONS AT
THE WESTERN ZINC SMELTER SITE
OPERABLE UNIT 5

California Gulch Superfund Site
Leadville, Colorado

SME-147	As		Cd	
	<250µm	<2mm	<250µm	<2mm
0-1"	194	142	ND	ND
1-2"	181	123	15	ND
2-6"	247	165	ND	ND
6-12"	189	99	23	ND

SME-147	Pb		Zn	
	<250µm	<2mm	<250µm	<2mm
0-1"	1,494	1,632	261	162
1-2"	1,170	1,114	179	ND
2-6"	1,593	1,497	192	133
6-12"	1,299	900	200	133

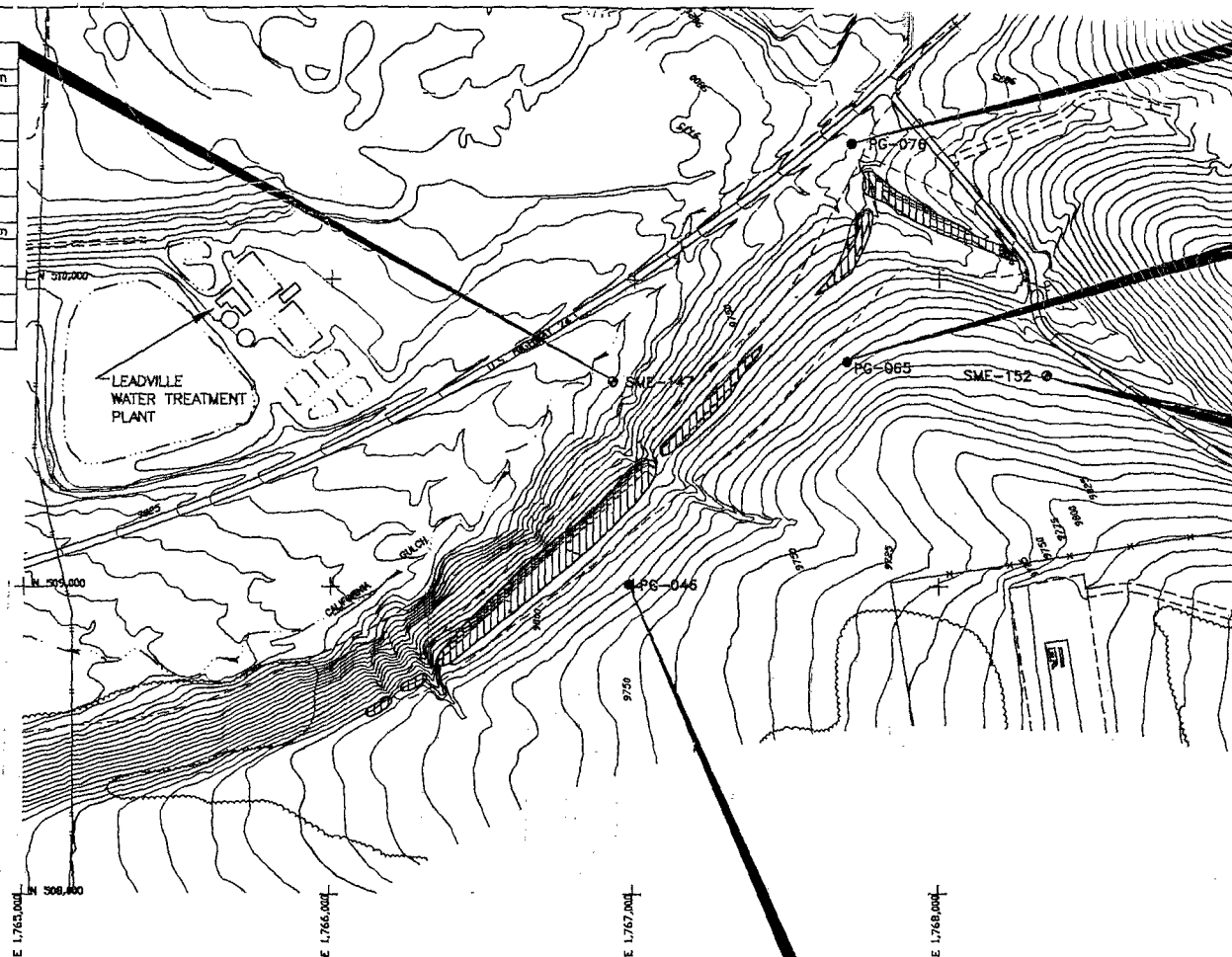
PG-076	As	Cd	Pb	Zn
0-1"	15	4.1	359.6	392.9
1-2"	82.9	3.5	1,315.6	768.8
2-6"	39.3	7.6	888.9	719.2
6-12"	91.3	15.5	1,479.3	723.3
12-18"	237.9	8.3	1,850.1	431.4

PG-065	As	Cd	Pb	Zn
0-1"	357.2	16.5	2,866	488.1
1-2"	274.2	18.4	1,703	378.1
2-6"	33.3	0.24	490.8	315.1
6-12"	22.2	12.9	103.3	213.6
12-18"	1.3	10.0	40.7	157.6

SME-152	As		Cd	
	<250µm	<2mm	<250µm	<2mm
0-1"	226	121	27	ND
1-2"	129	82	22	21
2-6"	44	48	ND	ND
6-12"	39	47	15	ND

SME-152	Pb		Zn	
	<250µm	<2mm	<250µm	<2mm
0-1"	2,863	963	1,572	644
1-2"	1,254	467	576	244
2-6"	282	144	259	221
6-12"	27	42	163	166

PG-046	As	Cd	Pb	Zn
0-1"	397.5	14.1	2,404.7	318.1
1-2"	179.1	3.0	1,323.1	177.0
2-6"	34.6	7.2	249	112.8
6-12"	10.9	ND	37.8	225.0
12-18"	4.9	0.24	36.5	82.0



SITE FEATURES		LEGEND		SAMPLE LOCATIONS	
	SLAG PILE		SMELTER RI (WASH, 1993)		SME-147 SAMPLE LOCATION
	CALIFORNIA GULCH		SOILS INVESTIGATION		PG-621 PRIMARY GRID (CDM, 1994)

NOTES: ALL CONCENTRATIONS ARE IN mg/kg SOLID MATERIAL.
UNLESS IDENTIFIED OTHERWISE, ALL SAMPLES ARE SOIL.
ND = NOT DETECTED

Figure 11
RESULTS OF INVESTIGATIONS AT THE ARKANSAS VALLEY SMELTER SOUTH HILLSIDE SLAG PILE SITE OPERABLE UNIT 5
California Gulch Superfund Site
Leadville, Colorado

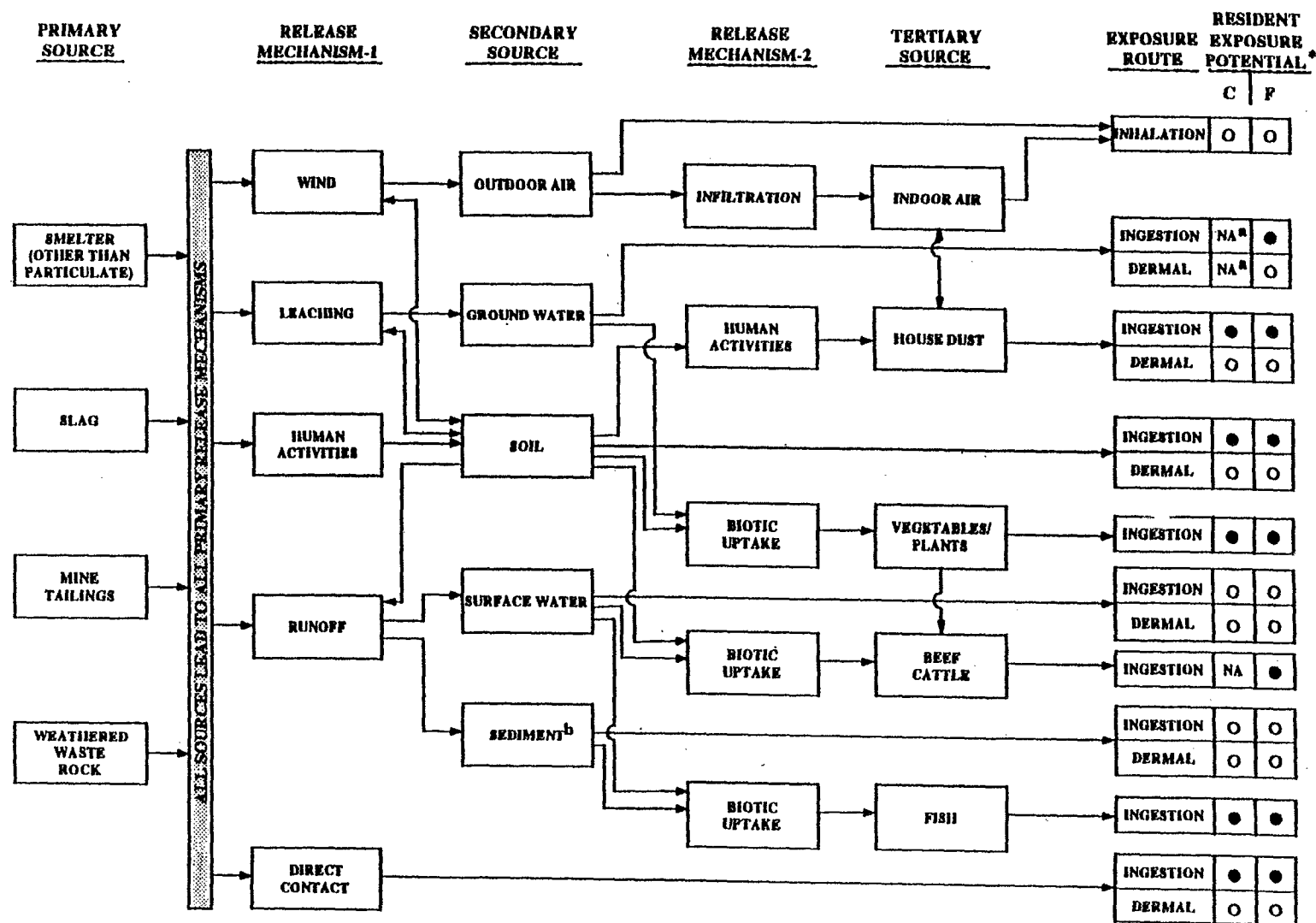


Figure 12

HUMAN HEALTH SITE CONCEPTUAL MODEL -
LEADVILLE AND STRINGTOWN RESIDENTS,
MINING AND ORE PROCESSING WASTES

California Gulch Superfund Site, Leadville, Colorado

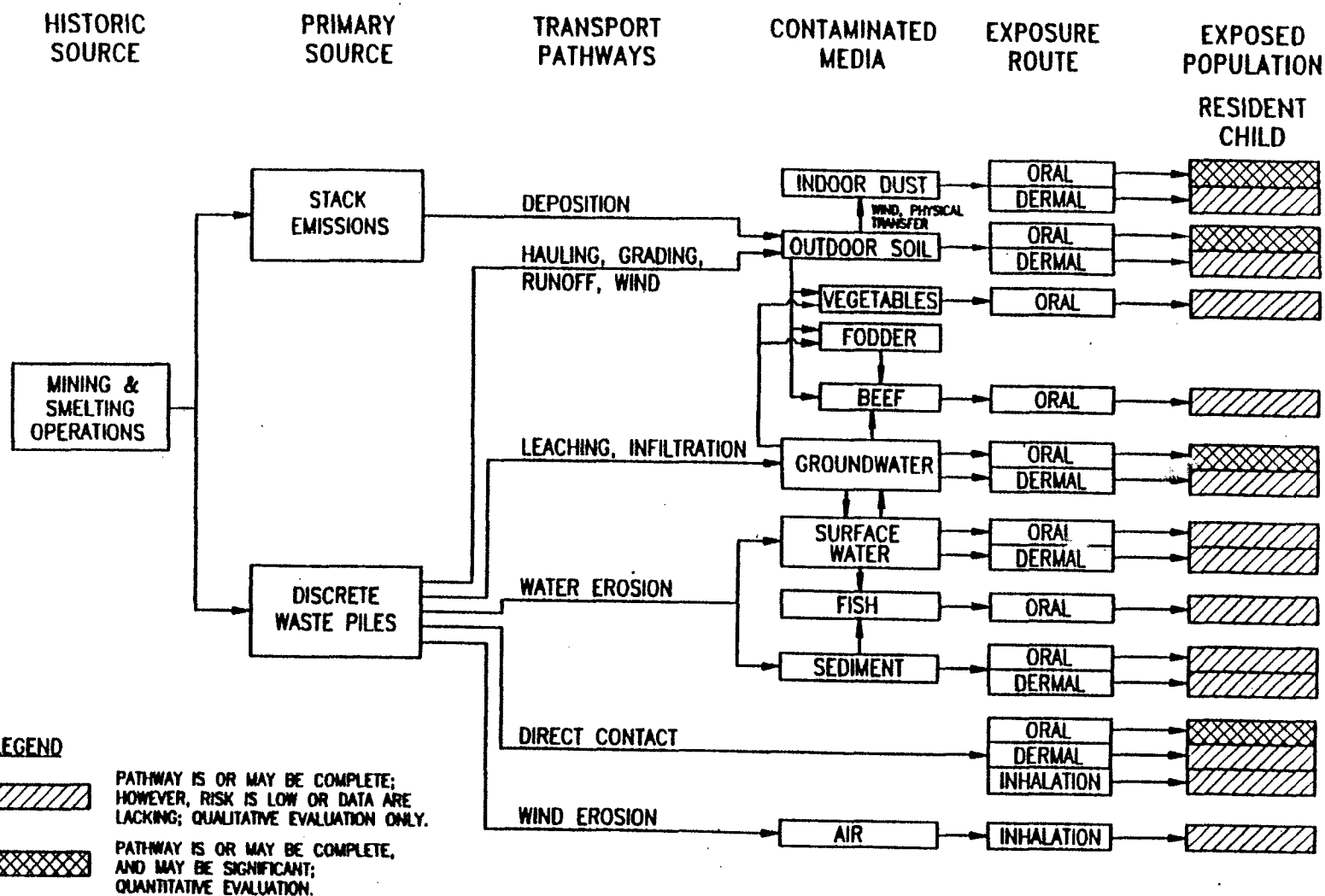


Figure 13

CONCEPTUAL SITE MODEL FOR
RESIDENTIAL EXPOSURE

California Gulch Superfund Site, Leadville, Colorado

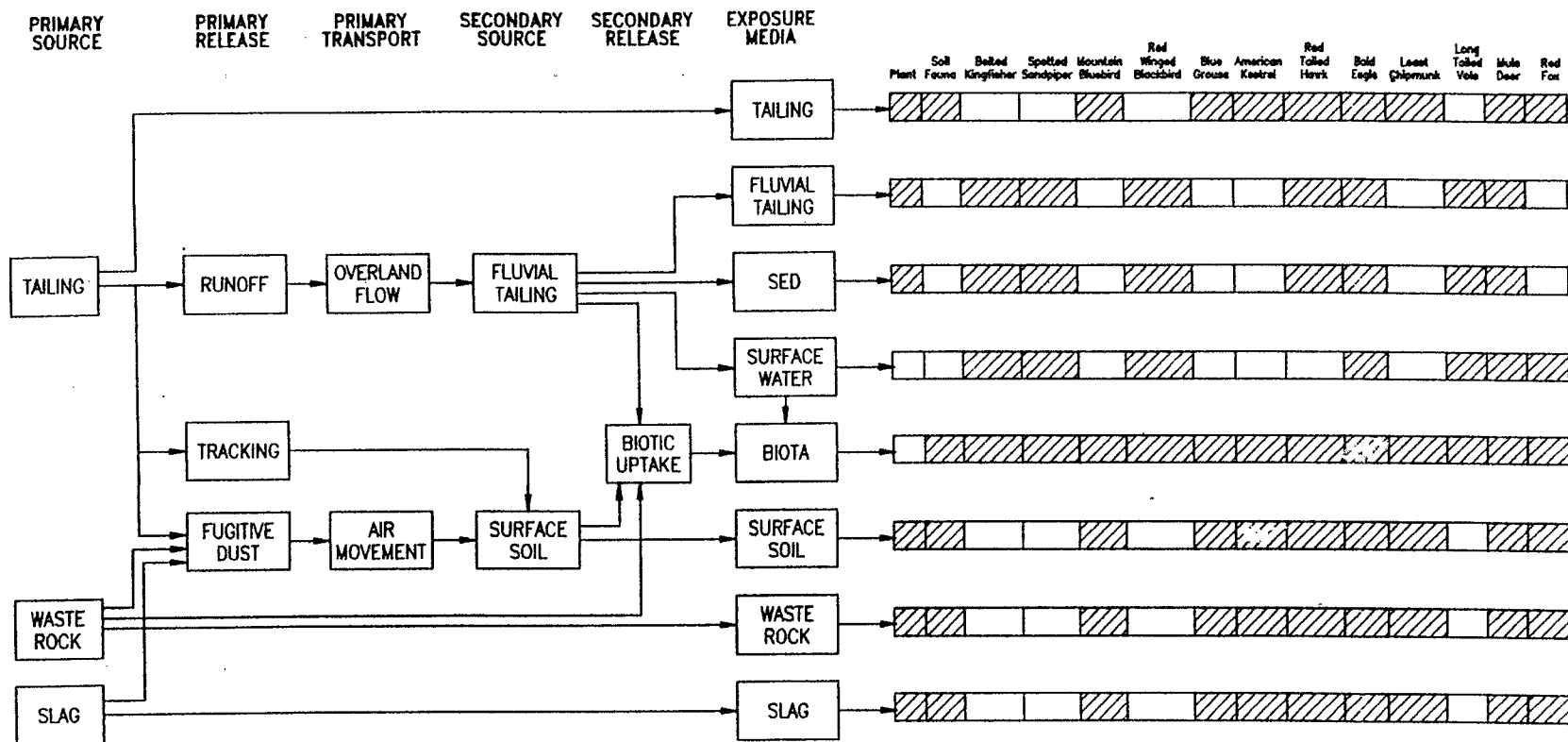


Figure 14

**CONCEPTUAL SITE MODEL
ECOLOGICAL RISK ASSESSMENT FOR THE
TERRESTRIAL ECOSYSTEM**

California Gulch Superfund Site, Leadville, Colorado

SOURCE: Ecological Risk Assessment for Terrestrial Ecosystem (WESTON, 1997)

TABLES

TABLE 1
RESULTS OF SURFACE WATER ANALYSES FOR GEORGIA GULCH AND EVANS GULCH
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Total Metals	Units	GG-1 (Ice-Off, 1991)	EG-1 (Spring 1991)	EG-1 (Fall 1991)	EG-2 (Spring 1991)
Aluminum	ug/L	2790	80.7	U	58.6
Antimony	ug/L	U	U	U	U
Arsenic	ug/L	40.6	1.3	U	2.7
Barium	ug/L	109	50.6	75.5	52.1
Cadmium	ug/L	4.6	0.80	0.48	0.87
Chromium	ug/L	U	U	U	U
Copper	ug/L	80.8	7.5	U	8.1
Iron	ug/L	4000	94.2	U	86.1
Lead	ug/L	932	8.6	U	8.2
Manganese	ug/L	325	U	U	13.8
Mercury	ug/L	U	U	U	U
Nickel	ug/L	U	U	U	U
Selenium	ug/L	U	U	U	U
Silver	ug/L	2.3	U	U	U
Zinc	ug/L	1180	113	60.9	101
Dissolved Metals					
Aluminum	ug/L	85.8	U	U	U
Antimony	ug/L	U	U	4.1	U
Arsenic	ug/L	11.2	U	U	U
Barium	ug/L	U	50.8	69.3	49.6
Cadmium	ug/L	1.9	0.54	0.32	0.46
Chromium	ug/L	U	U	U	U
Copper	ug/L	9.7	4.0	U	3.6
Iron	ug/L	61	U	U	U
Lead	ug/L	15.5	U	U	U
Manganese	ug/L	U	U	U	U
Mercury	ug/L	U	U	U	U
Nickel	ug/L	U	U	U	U
Selenium	ug/L	U	U	U	U
Silver	ug/L	U	U	U	U
Zinc	ug/L	34	U	U	U
Major Constituents					
pH (field)	S. U.	8.46	7.76	8.46	8.32
Alkalinity	mg/L	19	58	98	56
Calcium	mg/L	5	17	24	16
Chloride	mg/L	U	U	U	U
Cyanide	mg/L	U	U	NA	U
DOC	mg/L	U	15	2	16
Fluoride	mg/L	U	U	0.1	U
Magnesium	mg/L	U	8	12	8
Nitrate + nitrite as N	mg/L	0.02	0.04	U	0.05
Potassium	mg/L	U	U	U	U
Silica	mg/L	3	3	1	3
Sodium	mg/L	U	U	U	U
Specific Conductance	umhos/cm	35	137	189	136
Sulfate	mg/L	U	54	U	35
TDS	mg/L	50	96	96	82
TSS	mg/L	138	4	U	4
Total Phosphorus as P	mg/L	0.26	U	U	U

Source: Golder, 1996b.

EG-1 and EG-2: Evan Gulch surface water monitoring locations.

GG-1: Georgia Gulch surface water monitoring location.

U: Not analyzed

U: Not detected

ug/L: micrograms per liter

mg/L: milligrams per liter

TDS: total dissolved solids

TSS: total suspended solids

umhos/cm: micromhos per centimeter

TABLE 2
SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 No Action for Slag; Containment for Non-Residential Area Soils and Residential Area Soils; and Institutional Controls	Alternative 4 No Action for Slag; Removal/Transport/Disposal of Non- Residential Area Soils and Residential Area Soils to an On-Site Repository; and Institutional Controls
OVERALL PROTECTIVENESS				
Human Health Protection				
Airborne transport of contaminated materials	No significant pathways for transport of constituents from slag or soil to other environmental media have been identified.	No significant pathways for transport of constituents from slag or soil to other environmental media have been identified.	Containment would virtually eliminate potential for airborne transport of particles from the isolated areas of soil with elevated metals concentration.	Removal would virtually eliminate potential for airborne transport of particles from the isolated areas of soil with elevated metals concentration.
Erosion of contaminated materials into local water courses	No significant pathways for transport of constituents from slag or soil to other environmental media have been identified.	No significant pathways for transport of constituents from slag or soil to other environmental media have been identified.	Containment would virtually eliminate potential for erosion of materials into surface or groundwater from the isolated areas of soil with elevated metals concentration.	Removal would virtually eliminate potential for erosion of materials into surface or groundwater from the isolated areas of soil with elevated metals concentration.
Metals leaching and migration from soil into surface water	No significant pathways for transport of constituents from slag or soil to other environmental media have been identified.	No significant pathways for transport of constituents from slag or soil to other environmental media have been identified.	Containment would virtually eliminate potential for metals leaching into surface water from the isolated areas of soil with elevated metals concentration.	Removal would virtually eliminate potential for metals leaching into surface water from the isolated areas of soil with elevated metals concentration.
Metals leaching and migration from soil into groundwater	No significant pathways for transport of constituents from slag or soil to other environmental media have been identified.	No significant pathways for transport of constituents from slag or soil to other environmental media have been identified.	Containment would virtually eliminate potential for metals leaching into groundwater from the isolated areas of soil with elevated metals concentration.	Removal would virtually eliminate potential for metals leaching into groundwater from the isolated areas of soil with elevated metals concentration.
Contaminant exposure to animals and aquatic life	Potential risk to the terrestrial receptors through direct contact of certain sources at OU5 are considered low.	Potential risk to the terrestrial receptors through direct contact of certain sources at OU5 are considered low.	Incremental reduction of risk through elimination of direct contact of limited sources.	Incremental reduction of risk through elimination of direct contact of limited sources.

TABLE 2 (continued)
SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 No Action for Slag; Containment for Non-Residential Area Soils and Residential Area Soils; and Institutional Controls	Alternative 4 No Action for Slag; Removal/Transport/Disposal of Non- Residential Area Soils and Residential Area Soil to an On-Site Repository; and Institutional Controls
Prevent direct exposure of the population to elevated concentration of contaminants in the surface soil	Under current land use, average metals concentrations in soil do not exceed risk-based action level for a recreational use. Under future land use, no action may result in unacceptable exposure.	Under current land use, average metals concentrations in soil do not exceed risk-based action level for a recreational use. Under future land use, Institutional Controls would maintain protectiveness.	Containment would reduce potential risk associated with the isolated areas of soil with elevated metals concentration if a site were developed. Under future land use, Institutional Controls would maintain protectiveness.	Removal would reduce potential risk associated with the isolated areas of soil with elevated metals concentration if a site were developed. Under future land use, Institutional Controls would maintain protectiveness.
Environmental Protection	No significant risk associated with exposure to source material	Similar to Alternative 1, except institutional controls help ensure protection under future land use.	Similar to Alternative 1, except institutional controls help ensure protection under future land use. Containment and maintenance would virtually eliminate potential for risk to environment.	Similar to Alternative 1, except institutional controls help ensure protection under future land use. Disposal would virtually eliminate potential for risk to environment.
COMPLIANCE WITH ARARs				
Chemical-Specific ARARs	Chemical-specific ARARs are met.	Chemical-specific ARARs are met.	Chemical-specific ARARs are met.	Chemical-specific ARARs are met.
Location-Specific ARARs	Location-specific ARARs are met.	Location-specific ARARs are met.	Location-specific ARARs are met.	Location-specific ARARs are met.
Action-Specific ARARs	Action-Specific ARARs are met.	Action-Specific ARARs are met.	Action-Specific ARARs are met.	Action-Specific ARARs are met.
Other Criteria and Guidance	None identified.	None identified.	None identified.	None identified.

TABLE 2 (continued)
SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 No Action for Slag; Containment for Non-Residential Area Soils and Residential Area Soils; and Institutional Controls	Alternative 4 No Action for Slag; Removal/Transport/Disposal of Non- Residential Area Soils to a Residential Area Soil to an On-Site Repository; and Institutional Controls
LONG-TERM EFFECTIVENESS AND PERMANENCE				
Airborne transport of particles	No change in long-term effectiveness.	Similar to Alternative 1, except that institutional controls help ensure protection under future land use.	Containment would provide good long-term effectiveness and performance if maintained.	Disposal would provide good long-term effectiveness and permanence.
Erosion of materials into surface water or groundwater	No change in long-term effectiveness.	Similar to Alternative 1, except that institutional controls help ensure protection under future land use.	Containment would provide good long-term effectiveness and permanence if maintained.	Disposal repository would have to be erosion resistant. Long-term maintenance required.
Metals leaching into surface water	No change in long-term effectiveness. Minimal leaching potential.	Similar to Alternative 1, except that institutional controls help ensure protection under future land use.	Containment would provide good long-term effectiveness and permanence if maintained. Minimal leaching potential.	Disposal repository would provide good long-term effectiveness and permanence. Long-term maintenance required. Minimal leaching potential.
Metals leaching into groundwater	No change in long-term effectiveness. Minimal leaching potential.	Similar to Alternative 1, except that institutional controls help ensure protection under future land use.	Containment would provide good long-term effectiveness and permanence if maintained. Minimal leaching potential.	Disposal repository would provide good long-term effectiveness and permanence. Long-term maintenance required. Minimal leaching potential.
Contaminant exposure to animals and aquatic life	No change in long-term effectiveness.	Similar to Alternative 1, except Institutional controls help ensure protection under future land use.	Containment and institutional controls would provide good long-term effectiveness and permanence.	Disposal and institutional controls would provide good long-term effectiveness and permanence.
Adequacy and Reliability of Controls	No controls over remaining contamination. No reliability.	Similar to Alternative 1, except Institutional controls help ensure protection under future land use.	Containment would provide good control of source materials. Reliability can be high if maintained. Failure to maintain cover can increase potential for airborne transport, erosion, and leaching. Institutional controls are limited in effectiveness due to enforceability.	Disposal would provide good control of source materials. Reliability can be high if maintained. Failure to maintain repository can increase potential for airborne transport, erosion, and leaching. Institutional controls are limited in effectiveness due to enforceability.

TABLE 2 (continued)
SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 No Action for Slag; Containment for Non-Residential Area Soils and Residential Area Soils; and Institutional Controls	Alternative 4 No Action for Slag; Removal/Transport/Disposal of Non- Residential Area Soils and Residential Area Soils to an On -Site Repository; and Institutional Controls
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT				
Reduction of Toxicity, Mobility, or Volume	Does not include treatment.	Does not include treatment.	Does not include treatment.	Does not include treatment.
SHORT-TERM EFFECTIVENESS				
Community Protection	No disturbance to the community.	Under current land use, no disturbance to the community. Under future land use, potential minor risk to community due to increase in dust emissions and exposure of contaminants. Controllable through standard construction practices.	Minor risk to community due to increase in dust emissions and exposure of contaminants. Controllable through standard construction practices. Road traffic would increase over the short-term.	Minor risk to community due to increase in dust emissions and exposure of contaminants. Controllable through standard construction practices. Road traffic would increase over the short-term.
Worker Protection	No risk to workers.	Under current land use, no risk to workers. Under future land use, potential for inhalation of airborne particles and contact with contaminated materials during response activities.	Potential for inhalation of airborne particles and contact with contaminated materials during remedial activities.	Potential for inhalation of airborne particles and contact with contaminated materials during remedial activities.
Environmental Impacts	No change in short-term risk to the environment.	Under current land use, no change in short-term risk to the environment. Under future land use, potential minor risk to community due to increase in dust emissions and exposure of contaminants. Controllable through standard construction practices.	Minor risk to community due to increase in dust emissions and exposure of contaminants. Controllable through standard construction practices. Road traffic would increase over the short-term.	Minor risk to community due to increase in dust emissions and exposure of contaminants. Controllable through standard construction practices. Road traffic would increase over the short-term.

TABLE 2 (continued)
SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 No Action for Slag; Containment for Non-Residential Area Soils and Residential Area Soils; and Institutional Controls	Alternative 4 No Action for Slag; Removal/Transport/Disposal of Non- Residential Area Soils and Residential Area Soils to an On-Site Repository; and Institutional Controls
Time Until Action is Complete	Not applicable.	Immediate.	Immediate.	Immediate.
IMPLEMENTABILITY				
Ability to Construct and Operate	No construction or operation.	Under current land use, no construction or operation. Under future land use, relatively standard construction, if needed.	Relatively standard construction.	Relatively standard construction.
Ease of Doing More Action if Needed	May require ROD amendment if future action is taken.	Institutional controls allows for future response actions, if needed.	Institutional controls allows for future response actions, if needed.	Institutional controls allows for future response actions, if needed.
Ability to Monitor Effectiveness	No monitoring.	Land use plans/proposal for future land use would be monitored as part of the five-year review process.	Monitoring and maintenance inspections would give notice of failure before significant exposure occurs.	Land use plans/proposal for future land use would be monitored as part of the five-year review process.
Ability to Obtain Approvals and Coordinate with Other Agencies	No approval necessary.	Coordination and cooperation with property owners and local agencies would be necessary.	Coordination and cooperation with property owners and local agencies would be necessary.	Coordination and cooperation with property owners and local agencies would be necessary. Same as Alternative 2.
Ability of Equipment, Specialists, and Materials	None required.	None required for current land use. Standard equipment is readily available for future action as required.	Standard equipment is readily available.	Standard equipment is readily available.
Availability of Technologies	None required.	None required for current land use. Technology for screening and response actions is readily available.	Containment technology is readily available.	Removal, transport, and disposal technology is readily available.

TABLE 2 (continued)
SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Evaluation Criterial	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 No Action for Slag; Containment for Non-Residential Area Soils and Residential Area Soils; and Institutional Controls	Alternative 4 No Action for Slag; Removal/Transport/Disposal of Non- Residential Area Soils and Residential Area Soils to an On-Site Repository; and Institutional Controls
COST				
Capital Cost	\$0	\$33,600	\$83,445	\$129,875
Annual O&M Cost	\$0	\$2,500	\$3,500	\$3,000
Present Worth Cost (5% Rate of Return, 30 year period)	\$0	\$85,496	\$150,714	\$181,668
STATE ACCEPTANCE				
State Acceptance	Alternative not preferred by the State.	The State is aware of EPA's selected remedy and has chosen to make no further comment.	The State is aware of EPA's selected remedy and has chosen to make no further comment.	The State is aware of EPA's selected remedy and has chosen to make no further comment.
COMMUNITY ACCEPTANCE				
Community Acceptance	Alternative not preferred by the community	Alternative preferred by the community	Alternative no preferred by the community	Alternative no preferred by the community

TABLE 3
SUMMARY OF POTENTIAL CHEMICAL-SPECIFIC ARARS
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Standard, Requirement, Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
FEDERAL				
RCRA Subtitle C	40 CFR Part 261.4 (b)(7) and Section 3001 (b) (Bevill Amendment)	No	Yes	The sources of contamination at the OU5 EGWA Sites are various combinations of the following: tailing, waste rock, slag, and baghouse flue dust from processing of primary lead ore. Based on 40 CFR 261.4(b)(7) and Section 3001 (b) (Bevill Amendments), tailing, waste rock, and slag waste are excluded from RCRA Subtitle C. However, bag house/flue dust identified at the Western Zinc Smelter site is potentially subject to RCRA if these materials fail TCLP are disposed. Consolidation or on-site management of flue dust within area of contamination would not constitute disposal and, therefore, RCRA subtitle C would not be applicable. However, provisions of RCRA are potentially relevant and appropriate to flue dust. (See action-specific ARARs below).
Clean Air Act, National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50	No	No	National ambient air quality standards (NAAQS) are implemented through the New Source Review Program and State Implementation (SIP). The federal New Source Review Program addresses only major sources. Emissions associated with proposed remedial action at the OU5 EGWA Sites will be limited to fugitive dust emissions associated with earth moving activities during construction. These activities will not constitute a major source. Therefore, attainment and maintenance of NAAQS pursuant to the New Source Review Program are not ARARs. See Colorado Air Pollution Prevention and Control Act concerning applicability of requirements implemented through the SIP.

Table 3 (continued)
SUMMARY OF POTENTIAL CHEMICAL-SPECIFIC ARARS
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Standard, Requirement, Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
STATE OF COLORADO				
Colorado Air Pollution Prevention and Control Act	5 CCR 1001-14; 5 CCR 1001-10 Part C (I) Regulation 8	Yes	---	<p>Pursuant to the Colorado Air Pollution Prevention and Control Act, applicants for construction permits are required to evaluate whether the proposed source will exceed NAAQS. Applicants are also required to evaluate whether the proposed activities would cause an exceedance of the Colorado ambient standard for particulate 10 microns or less in aerodynamic diameter (PM10). Construction activities associated with proposed remedial action at the OU5 EGWA Sites will be limited to generation of fugitive dust emissions. Colorado regulates fugitive emissions through Regulation No. 1. Compliance with applicable provisions of the Colorado air quality requirements will be achieved by adhering to a fugitive emissions dust control plan prepared in accordance with Regulation No. 1. This plan will discuss monitoring requirements, if any, necessary to achieve these standards.</p> <p>Regulation No. 8 sets emission limits for lead. Applicants are required to evaluate whether the proposed activities would result in an exceedance of these standards. The proposed remedial action at the OU5 EGWA Sites is not expected to exceed the emission levels for lead, although some lead emissions may occur. Compliance with Regulation No. 8 will be achieved by adhering to a fugitive emissions dust control plan prepared in accordance with Regulation No. 1. This plan will discuss monitoring requirements, if any, necessary to achieve these standards.</p>

TABLE 4
SUMMARY OF POTENTIAL LOCATION-SPECIFIC ARARS
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Standard, Requirement, Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
FEDERAL				
National Historic Preservation Act (NHPA)	16 USC § 470 <u>et seq.</u> ; 40 CFR § 6.301(b); 36 CFR Part 63, Part 65, Part 800	Yes	---	Expands historic preservation programs; requires preservation of resources included in or eligible for listing on the National Register for Historic Places (NRHP). The OU5 EGWA Sites have been recommended as not eligible for listing on the NRHP and are not considered contributing to the Leadville Historic Mining District.
Executive Order 11593 Protection and Enhancement of the Cultural Environment	16 USC § 470	No	---	Directs federal agencies to institute procedures to ensure that programs contribute to the preservation and enhancement of non-federally owned historic resources. Consultation with the Advisory Council on Historic Preservation is required if removal activities should threaten cultural resources.
The Historic and Archaeological Data Preservation Act of 1974	16 USC 469 40 CFR § 6.301(c)	No	---	Establishes procedures to preserve historical and archeological data that might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity program.
The Historic Sites Act 1935	16 USC § 461-467	No	No	Preserves for public use historic sites, buildings, and objects of natural significance.
The Archeological Resources Protection Act of 1979	16 USC §§ 470aa-47011	No	Yes	Requires a permit for any excavation or removal of archeological resources from public lands or Indian lands. May be relevant and appropriate if archeological resources are encountered during remedial activities.
Executive Order No. 11990 Protection of Wetlands	40 CFR § 6.302(a) and Appendix A	Yes	---	Minimizes adverse impacts on areas designated as wetlands.
Executive Order No. 11988 Flood plain Management	40 CFR § 6.302 & Appendix A	Yes	---	Pertains to floodplain management and construction of impoundments in such areas.

TABLE 4 (continued)
SUMMARY OF POTENTIAL LOCATION-SPECIFIC ARARS
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Standard, Requirement, Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
Section 404, Clean Water Act (CWA)	33 USC 1251 <u>et seq.</u> 33 CFR Part 330	Yes	---	Regulates discharge of dredged or fill materials into waters of the United States. Portions of the OU5 EGWA Sites are adjacent to waters of the U.S. Substantive requirements of portions of Nationwide Permit No. 38 (General and Specific Conditions) are applicable to OU5 EGWA Sites remedial activities conducted within waters of the United States, although none are anticipated.
Fish and Wildlife Coordination Act	16 USC § 661 <u>et seq.</u> ; 40 CFR § 6.302	No	No	Requires coordination with federal and state agencies to provide protection of fish and wildlife in water resource development programs; regulates actions that impound, divert, control, or modify any body of water. However, proposed remedial action activities at the OU5 EGWA Sites will not affect fish or wildlife. If it appears that remedial activities may impact wildlife resources, EPA will coordinate with both the U.S. Fish and Wildlife Service and the Colorado Department of Natural Resources.
Endangered Species Act	16 USC § 14531 <u>et seq.</u> ; 50 CFR §§ 200 and 402	No	No	Provides protection for threatened and endangered species and their habitats. However, site-specific studies did not document the presence of threatened or endangered species. If threatened or endangered species are encountered during remedial activities at the OU5 EGWA Sites, then requirements of this Act would be applicable.
Wilderness Act	16 USC 1311; 16 USC 668; 50 CFR 53; 50 CFR 27	No	No	Limits activities within areas designated as wilderness areas or National Wildlife Refuge Systems. Remedial activities planned for OU5 EGWA Sites will not impact any designated areas. The Act is, therefore, not a potential ARAR.
Resource Conservation and Recovery Act (RCRA), Subtitle D	40 CFR Part 257 Subpart A, § 257.3-1 Floodplains, paragraph (a)	No	No	Provides general classification criteria for solid waste disposal facilities pertaining to floodplains. Remedial activities planned for OU5 EGWA Sites will not involve establishment of a solid waste disposal facility.
STATE OF COLORADO				
Colorado Historical, Prehistorical, and Archaeological Resources Act	CRS §§ 24-80-401 to 410 1301 to 1305	No	Yes	Concerns historical, prehistorical, and archaeological resources; applies only to areas owned by the State or its political subdivision. May be relevant and appropriate if removal action impacts an archeological site.

TABLE 4 (continued)
SUMMARY OF POTENTIAL LOCATION-SPECIFIC ARARS
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Standard, Requirement, Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
Colorado Register of Historic Places	CRS §§24-80.1-101 to 108	No	No	Authorizes the State Historical Society to nominate properties for inclusion on the State Register of Historic Places. Applicable only if removal action activities impact an area listed on the Register.
Nongame, Endangered or Threatened Species Act	CRS §§ 33-2-101 to 108	No	No	Standards for regulation of nongame wildlife and threatened and endangered species. Site-specific studies did not document the presence of threatened or endangered species. If threatened or endangered species are encountered during remedial activities at the OU5 EGWA Sites, then requirements of the Act will be applicable.
Colorado Species of Special Concern and Species of Undetermined Status	Colorado Division of Wildlife Administrative Directive E-1, 1985, modified	No	No	Protects species listed on the Colorado Division of Wildlife generated list. Urges coordination with the Division of Wildlife if wildlife species are to be impacted. No evidence of species of special concern have been identified at the OU5 EGWA Sites.
Colorado Natural Areas	Colorado Revised Statutes, Title 33 Article 33, § 104	No	No	Maintains a list of plant species of special concern. Although not protected by State statute, coordination with Division of Parks and Outdoor Recreation is recommended if activities will impact listed species.
Colorado Solid Waste Disposal Sites and Facilities Act	6 CCR 1007-2 6 CCR 1007-2, Part I	Yes	No	Establishes regulations for solid waste management facilities, including location standards. None of the proposed remedial actions in OU5 will establish a solid waste management facility. Selected portions potentially applicable if future activities establish a solid waste management facility.
Colorado Noise Abatement Act	CRS § 25-12-101 to 108	Yes	—	Establishes maximum permissible noise levels for particular time periods and land use related to construction projects.

TABLE 5
SUMMARY OF POTENTIAL ACTION-SPECIFIC ARARS
OU5 EGWA SITE
CALIFORNIA GULCH SUPERFUND SITE

Standard, Requirement, Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
FEDERAL				
Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (RCRA)	40 CFR Part 257, Subpart A: § 257.3-1 Floodplains, paragraph (a); § 257.3-7 Air, paragraph (b)	Yes	---	Selected portions of Part 257 pertaining to floodplains and air are applicable. These provisions establish criteria for classification of solid waste disposal facilities and practices.
Hazardous Materials Transportation Act	49 USC § 1801-1813 49 CFR 107, 171-177	Yes	No	Regulates transportation of hazardous materials. Would be applicable if future remedial action at the OU5 EGWA Sites involved the off site disposal of flue dust.
STATE OF COLORADO				
Colorado Air Quality Control Act	5 CCR 1001-4 Regulation No. 2, Odors	Yes	---	Applicable only if remedial action activities cause objectionable odors. Remedial action at the OU5 EGWA Sites is not expected to produce odors.
Colorado Air Quality Control Act	5 CCR 1001-5 Regulation No. 3, APENs	Yes	---	Substantive provisions of APENS will be met. Establishes emissions control regulations for construction or modification of stationary sources. An APEN will be filed if future remedial actions disturb contaminated soils.
Colorado Air Quality Control Act	5 CCR 1001-3; § III.D.1.b,c,d. § III. D.2.a,b,c,e,f,g. Regulation No. 1	Yes	---	Regulation No. 1 provisions concerning fugitive emissions for construction activities, storage and stockpiling activities, haul roads, haul trucks, and tailing ponds are applicable (5 CCR 1001-3; Sections III.D.2.a,b,c,e,f,g.). Construction activities at the OU5 EGWA Sites, if any, will be conducted in accordance with a fugitive emissions dust control plan.
Colorado Solid Waste Disposal Sites and Facilities Act	6 CCR 1007-2	No	Yes	Establishes standards for licensing, locating, constructing and operating solid waste disposal facilities. Future remedial activities planned for OU5 EGWA Site may involve the disposal of solid waste.

TABLE 5 (continued)
SUMMARY OF POTENTIAL ACTION-SPECIFIC ARARS
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE

Standard, Requirement, Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
Colorado Water Quality Control Act, Storm Water Discharge Regulations	5 CCR 1002-2	Yes	---	Establishes requirements for storm water discharges (except portions relating to Site-wide Surface and Groundwater). Substantive requirements for storm water discharges associated with construction activities are applicable.
Colorado Mined Land Reclamation Act	CRS 34-32-101 to 125; Rule 3 of Mineral Rules and Regulations	No	Yes	Regulates all aspects of land use for mining, including the location of mining operations and related reclamation activities and other environmental and socio-economic impacts. Substantive requirements of portions of Rule 3 regarding Reclamation Measures, Water - General Requirements (except portions relating to Site-wide Surface and Ground Water), Wildlife, and Revegetation are potentially relevant and appropriate.
Colorado Noise Abatement Act	CRS §§ 25-12-101 to 108	Yes	---	Establishes maximum permissible noise levels for particular time periods and land use related to construction projects.
Regulations on the Collection of Aquatic Life	2CCR 406-8, Ch. 13, Article III, § 1316	No	No	Requirements governing the collection of aquatic life samples for scientific purposes. Remedial action activities within the OU5 EGWA Sites will not include biological monitoring.

TABLE 6
DETAILED COST ESTIMATE: ALTERNATIVE 2 - INSTITUTIONAL CONTROLS
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND, SITE

Item/Description	Quantity	Unit	Unit Cost	Total Cost
<u>DIRECT CAPITAL COSTS</u>				
Institutional Controls				
Program Development	80	hr	80	\$6,400
Program Implementation	200	hr	80	\$16,000
SUBTOTAL DIRECT CAPITAL COSTS				\$22,400
<u>INDIRECT CAPITAL COSTS</u>				
Indirect Capital Costs				
Administration Costs			15%	\$3,360
Construction Management Costs			0%	\$0
Permit Costs			0%	\$0
SUBTOTAL INDIRECT CAPITAL COSTS				\$3,360
Capital Costs Contingency (Applied to both Direct Indirect Costs)			20%	\$7,840
TOTAL ESTIMATED CAPITAL COSTS				\$33,600
<u>ANNUAL OPERATION & MAINTENANCE COSTS</u>				
Administrative Costs	1	ls	2,500	\$2,500
TOTAL ANNUAL O&M COSTS				\$2,500
<u>FIVE YEAR REVIEW COSTS</u>				
Labor - 1 Engineers (\$100/hr) & 1 Technicians (\$70/hr) - 1 week @ 40 hrs/wk	40	mh	80.00	\$3,200
Travel	2	each	100.00	\$200
Per diem	2	mndy	50.00	\$100
Laboratory Costs	0	each	0.00	\$0
Office/Administrative	20	mh	45.00	\$900
SUBTOTAL FIVE YEAR REVIEW COSTS				\$4,400
Five Year Review Contingency			0.10	\$440
TOTAL FIVE YEAR REVIEW COSTS				\$4,840
TOTAL PRESENT WORTH				\$85,496
(5% rate of return 30 year period)				

TABLE 7
PRESENT WORTH ANALYSIS: ALTERNATIVE 2 - INSTITUTIONAL CONTROLS
OU5 EGWA SITE
CALIFORNIA GULCH SUPERFUND SITE

Year	Capital Costs	O&M Costs	Total Annual Expenditure	Rate of Return =3%		Rate of Return = 5%		Rate of Return = 10%	
				Discount Factor	Present Worth	Discount Factor	Present Worth	Discount Factor	Present Worth
0	\$33,600		\$33,600	1.0000	\$33,600	1.0000	\$33,600	1.000	\$33,600
1		\$2,500	\$2,500	0.9709	\$2,427	0.9524	\$2,381	0.9091	\$2,273
2		\$2,500	\$2,500	0.9426	\$2,356	0.9070	\$2,268	0.8264	\$2,066
3		\$2,500	\$2,500	0.9151	\$2,288	0.8638	\$2,160	0.7513	\$1,878
4		\$2,500	\$2,500	0.8885	\$2,221	0.8227	\$2,057	0.6830	\$1,708
5		\$7,340	\$7,340	0.8626	\$6,332	0.7835	\$5,751	0.6209	\$4,558
6		\$2,500	\$2,500	0.8375	\$2,094	0.7462	\$1,866	0.5645	\$1,411
7		\$2,500	\$2,500	0.8131	\$2,033	0.7107	\$1,777	0.5132	\$1,283
8		\$2,500	\$2,500	0.7894	\$1,974	0.6768	\$1,692	0.4665	\$1,166
9		\$2,500	\$2,500	0.7664	\$1,916	0.6446	\$1,612	0.4241	\$1,060
10		\$7,340	\$7,340	0.7441	\$5,462	0.6139	\$4,506	0.3855	\$2,830
11		\$2,500	\$2,500	0.7224	\$1,806	0.5847	\$1,462	0.3505	\$876
12		\$2,500	\$2,500	0.7014	\$1,753	0.5568	\$1,392	0.3186	\$797
13		\$2,500	\$2,500	0.6810	\$1,702	0.5303	\$1,326	0.2897	\$724
14		\$2,500	\$2,500	0.6611	\$1,653	0.5051	\$1,263	0.2633	\$658
15		\$7,340	\$7,340	0.6419	\$4,711	0.4810	\$3,531	0.2394	\$1,757
16		\$2,500	\$2,500	0.6232	\$1,558	0.4581	\$1,145	0.2176	\$544
17		\$2,500	\$2,500	0.6050	\$1,513	0.4363	\$1,091	0.1978	\$495
18		\$2,500	\$2,500	0.5874	\$1,468	0.4155	\$1,039	0.1799	\$450
19		\$2,500	\$2,500	0.5703	\$1,426	0.3957	\$989	0.1635	\$409
20		\$7,340	\$7,340	0.5537	\$4,064	0.3769	\$2,766	0.1486	\$1,091
21		\$2,500	\$2,500	0.5375	\$1,344	0.3589	\$897	0.1351	\$338
22		\$2,500	\$2,500	0.5219	\$1,305	0.3418	\$855	0.1228	\$307
23		\$2,500	\$2,500	0.5067	\$1,267	0.3256	\$814	0.1117	\$279
24		\$2,500	\$2,500	0.4919	\$1,230	0.3101	\$775	0.1015	\$254
25		\$7,340	\$7,340	0.4776	\$3,506	0.2953	\$2,168	0.0923	\$677
26		\$2,500	\$2,500	0.4637	\$1,159	0.2812	\$703	0.0839	\$210
27		\$2,500	\$2,500	0.4502	\$1,125	0.2678	\$670	0.0763	\$191
28		\$2,500	\$2,500	0.4371	\$1,093	0.2551	\$638	0.0693	\$173
29		\$2,500	\$2,500	0.4243	\$1,061	0.2429	\$607	0.0630	\$158
30		\$7,340	\$7,340	0.4120	\$3,024	0.2314	\$1,698	0.0573	\$421
TOTAL PRESENT WORTH				@ 3%		@ 5%		@ 10%	
				\$100,470		\$85,496		\$64,641	

APPENDIX A

RESPONSIVENESS SUMMARY

**RESPONSIVENESS SUMMARY
OU5 EGWA SITES
CALIFORNIA GULCH SUPERFUND SITE
LEADVILLE, COLORADO**

1.0 OVERVIEW

The U. S. Environmental Protection Agency (EPA) has prepared this Responsiveness Summary to document and respond to issues and comments raised by the public regarding the Proposed Plan for the Operable Unit 5 (OU5) for Elgin Smelter, Grant/Union Smelter, Western Zinc Smelter and Arkansas Valley South Hillside Slag Pile sites (collectively known as the "EGWA" sites) of the California Gulch Superfund Site. EPA's preferred alternative and the remedy selected in the Record of Decision (ROD) involves institutional controls, which consists of measures to provide information to current and/or future land owners regarding the environmental conditions at the site through a zoning "overlay district," and to ensure that if the site is developed any necessary special precautions or requirements are followed. Any sampling or response actions will be conducted or funded by ASARCO, Inc., consistent with the development plans. A public meeting was held on August 1, 2000 at 7:00 p.m. at the Mining Hall of Fame and Museum in Leadville, Colorado to present the preferred alternative to the public. Comments were received during the public comment period, which was from July 27 through August 28, 2000.

Comments received during the public comment period and EPA's responses, are outlined in this document. By law, the EPA and the Colorado Department of Public Health and Environment (CDPHE) must consider public input prior to making a final decision on a cleanup remedy. Once public comment is reviewed and considered, the final decision on a cleanup remedy is documented in the ROD. This document includes the following sections:

- Background on Recent Community Involvement
- Summary of Public Comments Received During Public Comment Period and Agency Responses
- Remaining Concerns

2.0 BACKGROUND ON RECENT COMMUNITY INVOLVEMENT

The OUS EGWA Proposed Plan was published in July 2000 and describes the preferred cleanup alternative for EGWA sites. Based upon consideration of National Oil and Hazardous Substances Pollution Contingency Plan (NCP) criteria, EPA determined that Alternative 2 - Institutional Controls is the appropriate remedy for slag and non-residential and residential area soils at the OU5 EGWA sites. A portion of the public meeting held on August 1, 2000 was dedicated to accepting formal oral comments from the public; however, no oral comments were received. The only written comments received during the public comment period were from the CDPHE in a letter dated August 28, 2000.

3.0 SUMMARY OF PUBLIC COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD AND AGENCY RESPONSE

The following written comments were received from the CDPHE during the public comment period. No oral comments were received. The comments are presented in italicized type and the responses are presented in regular type.

No. 1:

As previously presented in draft Proposed Plan comments submitted to EPA dated 10/25/99, 7/5/00, and 7/11/00 the CDPHE proposed Hot Spot Removal Plan, 3/28/00, since contamination has been identified above EPA's action levels for reasonably anticipated uses, CDPHE believes that there are advantages to expeditiously removing the hot spots and proceeding with immediate deletion of the EGWA sites. If the proposed Institutional Control Overlay

(ICO) District is selected, it is not clear when these sites would be eligible for deletion. It should also be noted that the proposal for the use of the overlay district is currently in the developmental stage, making it impossible at this time for the state or public to provide meaningful comments on the adequacy of this approach. If EPA consistently applied this logic of deferring clean-up to sites nation-wide, contamination would simply remain in-place indefinitely awaiting development. This is clearly not the approach contemplated in the NCP and CERCLA (as discussed in our previous comments submitted by EPA).

Response:

Under current land use, there is no unacceptable risk associated with the contamination left in place at the EGWA smelter sites. It is possible that land use could change for some of the properties associated with these sites. The proposed institutional control overlay district would insure that any future land use will follow any necessary precautions or requirements associated with the waste left in place. The requirements would include conditions that must be met to ensure protectiveness and may require additional sampling and response actions consistent with the future use or development plans.

EPA is currently preparing an institutional control analysis and design, which includes the proposed institutional control overlay district. This document will be available for public review and comment. It is anticipated that once the institutional control program is in place, these sites may be deleted from the National Priorities List. Note that this approach is consistent with the institutional control overlay district proposed for Residential Soils within Operable Unit 9 of this Superfund Site as well as other areas of the Site where waste is left in place.

EPA disagrees that removal of these "hot spots" offers significant advantages over the selected institutional control remedy. Removal would be limited to a depth of two feet and would still likely require institutional controls to ensure that any future development remains protective of human health and the environment.

No. 2:

It is not clear how costs were determined More explanation is needed (such as an itemized breakout of capital costs and O&M activities) for what constitutes "capital costs " and what activities would be covered by O&M. Please clarify if developer or county costs for sampling/analysis and review/ approval activities have been determined and are included.

Response:

As shown on Table 7, Detailed Cost Estimate: Alternative 2 - Institutional Controls, of the OU5 EGWA ROD, direct capital costs include program development and program implementation of institutional controls. Indirect capital costs include administration costs, construction management costs, and permit costs. A contingency is applied to both direct and indirect capital costs. The operation and maintenance (O&M) costs include annual administrative costs and five year review costs, which includes labor, travel, per diem, laboratory, and office/administrative costs. A contingency is applied to the five year review costs.

ASARCO Inc. (Asarco), the responsible party, will be responsible for any sampling, laboratory analysis, and response costs. EPA will review and approve any response plans. The sampling and response costs funded by Asarco and the cost for EPA's review and approval effort were not included in the cost estimate because of the many uncertainties associated with these activities.

4.0 REMAINING CONCERNS

Remaining Concerns

Based on review of the written comments received during the public comment period (no oral comments were received), there are no outstanding issues associated with implementation of the proposed remedial action.